THE COTTON GIN AND OIL MILL

Press

MARCH 18, 1961

THE MAGAZINE OF THE COTTON GINNING AND OILSEED PROCESSING INDUSTRIES

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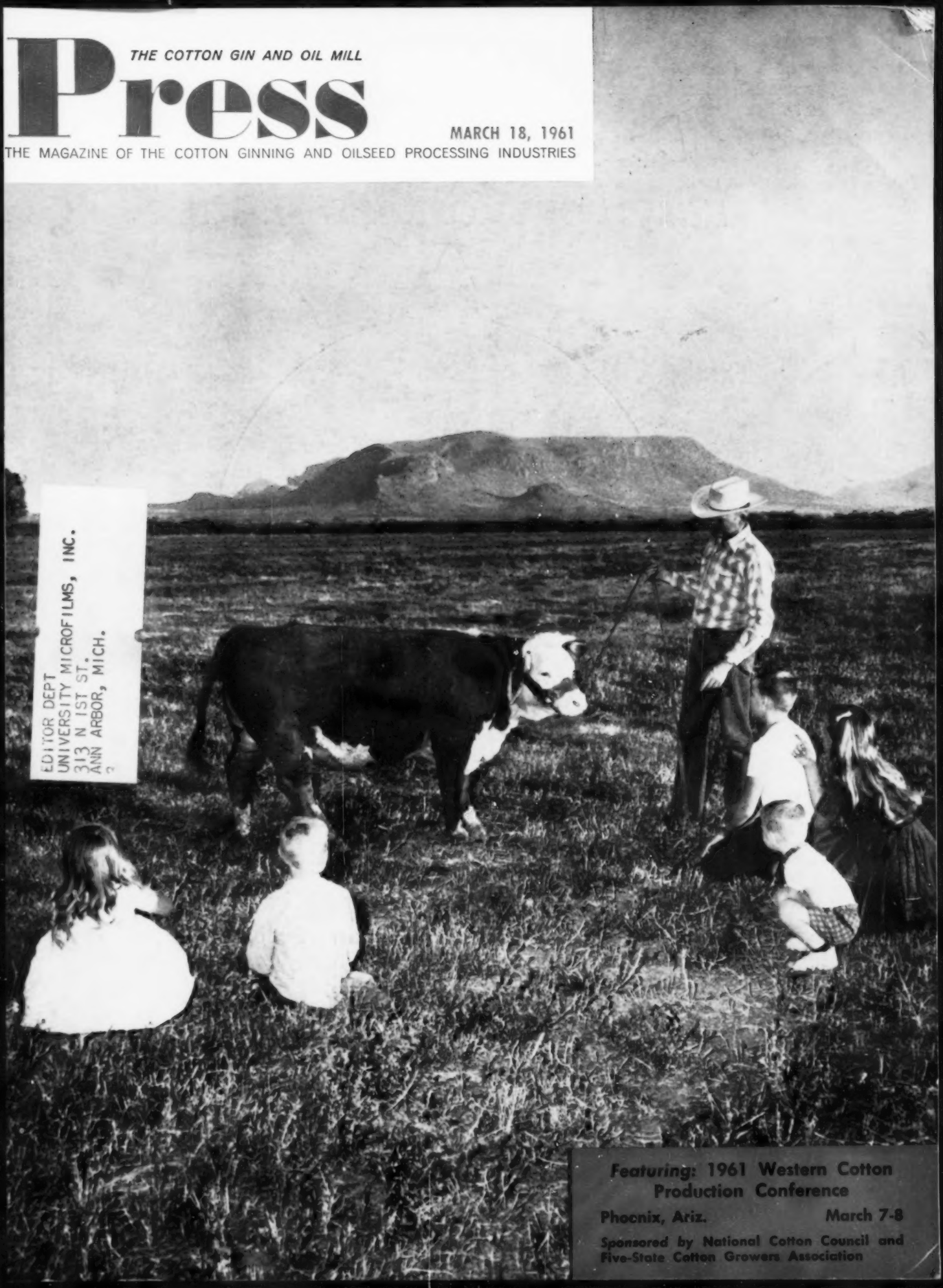

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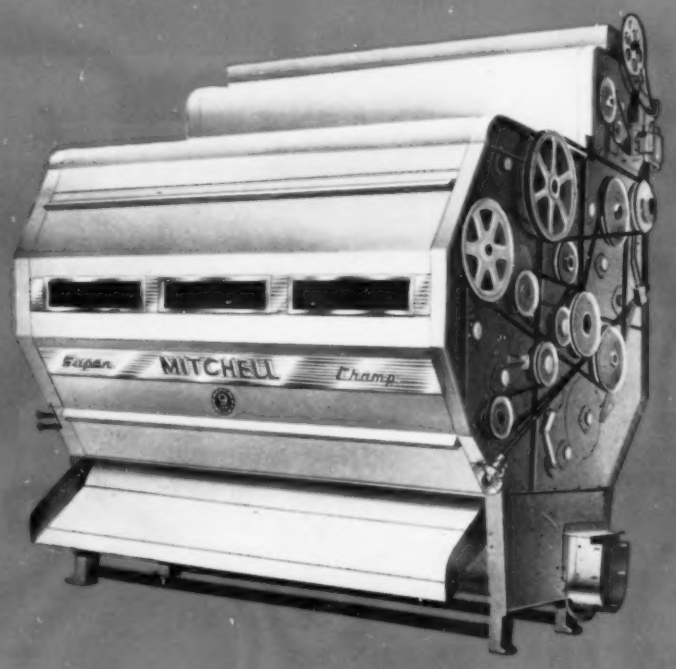

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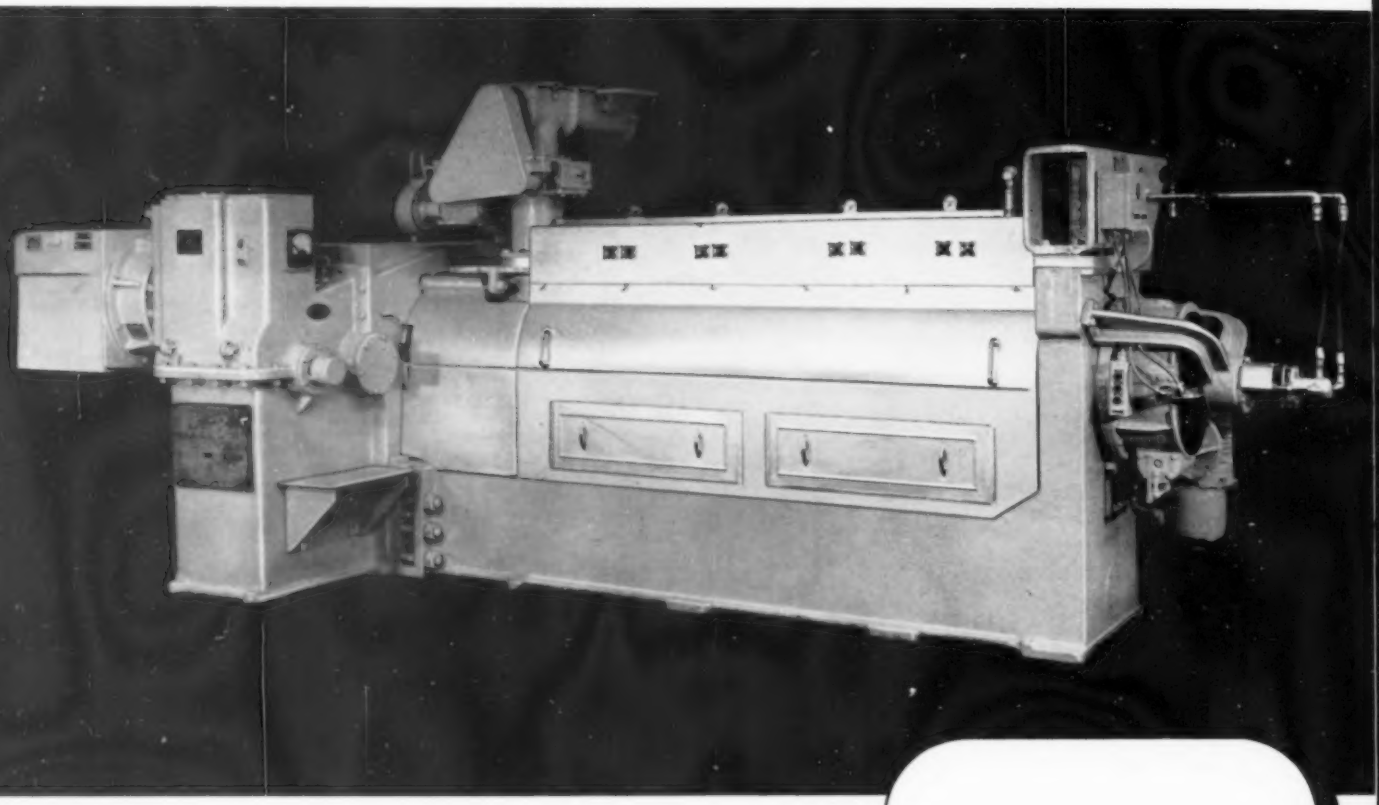

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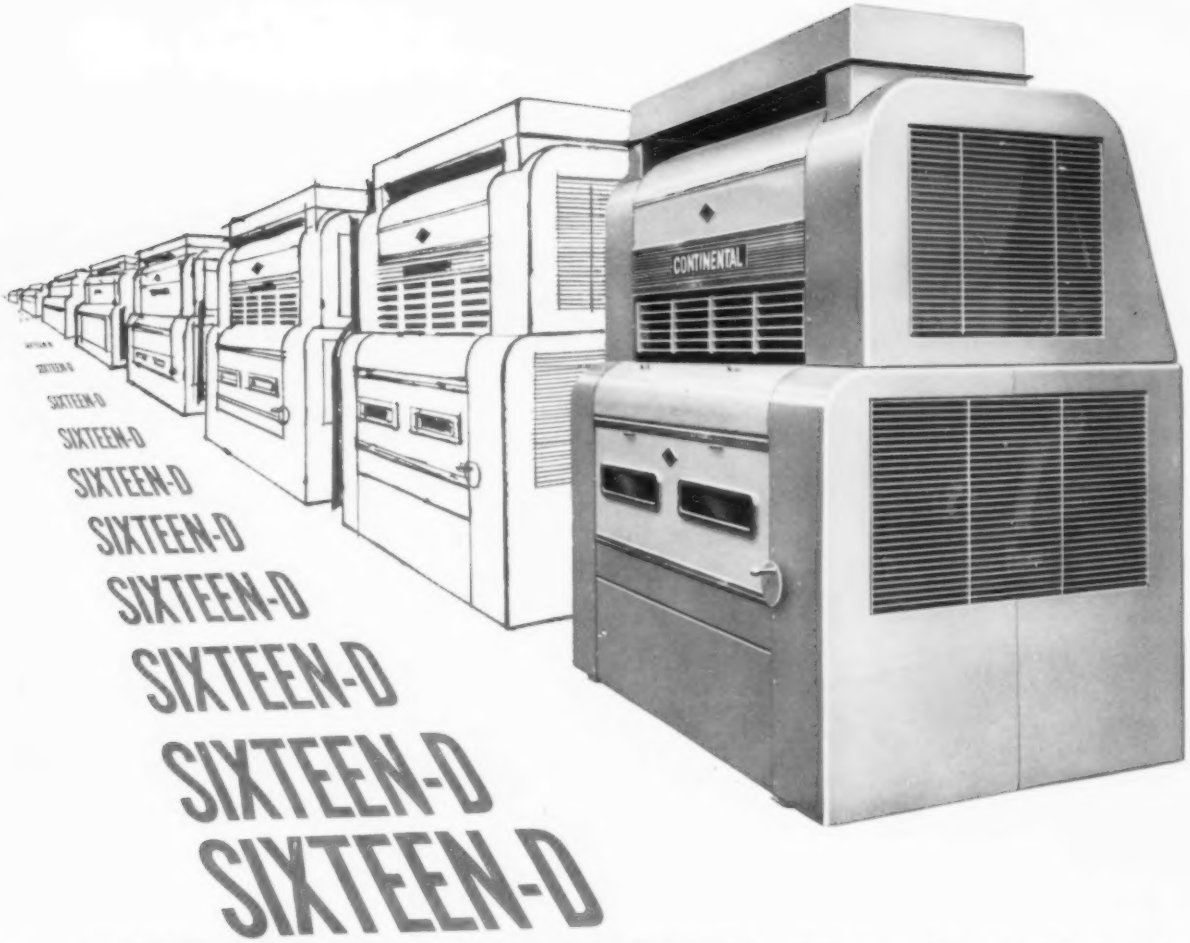

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CONTINENTAL GIN COMPANY

VOL. 62 MARCH 18, 1961 NO. 6

THE COTTON GIN AND OIL MILL PRESS

THE COTTON GIN AND OIL MILL PRESS...
READ BY COTTON GINNERS, COTTONSEED CRUSHERS AND OTHER OILSEED PROCESSORS FROM CALIFORNIA TO THE CAROLINAS

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OFFICIAL MAGAZINE OF:
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OUR COVER PICTURE:

Whether it grows cotton or cattle, the farm or ranch offers a youngster opportunities to learn that are missed by city kids. G. X. Sherry of Deming, N.M., is pictured on our cover explaining to his five children what a showring judge—or a buyer—looks for in a good Hereford. And, don't think that even the littlest of the kids won't remember some of the things that Dad is telling.

Photo by John White

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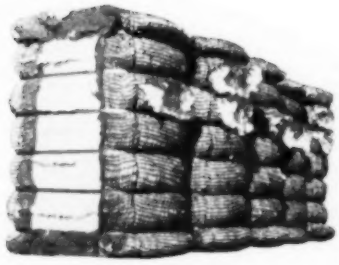

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Here is a new FIRST from Hardwicke-Etter . . . a hull, stick and leaf remover incorporating both proven principles of trash extraction: sling-off and saw cylinder-gridbar. In addition, the ***HUSTLER*** has H-E's time-proven reclaimer section which is designed to prevent lint loss.

The ***HUSTLER*** is a compact unit that fits anywhere in the gin. It is made in two sizes, 70" and 96", and in two styles, gravity type and pneumatic type.

The basic ***HUSTLER*** unit is made in two sections: the top is the sling-off section with the green leaf, stick remover and reclaimer section at the bottom. Additional green leaf and stick cylinder-grid bar units can be easily and quickly installed between the two basic sections any time additional cleaning is desired.

The ***HUSTLER*** is everything its name implies . . . a superb HUll-STick-LEaf Remover that has a place in every gin where excessive trash and green leaf problems exist.

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For 30 years, USDA research has aided cotton ginners

By C. SCOTT SHAW

GINNING RESEARCH at Stoneville, Miss., by U.S. Department of Agriculture has contributed to cotton progress for 30 years.

This research began because multi-million-dollar yearly losses from efforts to handle damp seed cotton caused prominent cotton leaders of the Louisiana and Mississppi Deltas to urge national research to prevent moisture damage.

Bolton Smith, then of Smith & Williams, Memphis, interested cotton leaders of Louisiana and Mississippi in discussing the problem with USDA officials. The late S. H. McCrory, then chief agricultural engineer, Bureau of Public Roads, and Dr. Arthur W. Palmer, then chief of the Cotton Division, Bureau of Agricultural Economics, enlisted their staffs in studying the problem.

In 1926, McCrory obtained the transfer of Charles A. Bennett, principal agricultural engineer, now retired, from the U.S. Navy Civil Service rolls to those of the Agricultural Engineers. By August, Bennett was at the Department's Entomology and Plant Quarantine Station at Tallulah, La. From here, Bennett conducted cotton drying research at gins along the Mississippi River. From 1926 to 1929 his research resulted in a number of public patents on cotton drying processes and apparatus.

These public patents and driers of Bennett at Tallulah encouraged a drive for the establishment of Cotton Ginning and Fiber Laboratories at Stoneville. Fortunately, parallel research by Dr. Robert W. Webb in Washington had brought improvements in cotton fiber measurement by the array method and other means.

Bolton Smith, leaders from Washington County, Miss., (including W. E. Ayres, B. B. Payne, C. E. Robbs, R. H. Hilliard and others), Mississippi Staple Cotton Cooperative and Cotton Ginners Association actively supported Congressman Whittington (Mississippi) and Buchanan (Texas) in introducing legislation. This provided, in addition to annual Departmental appropriations, the following specific authority for cotton ginning investigations:

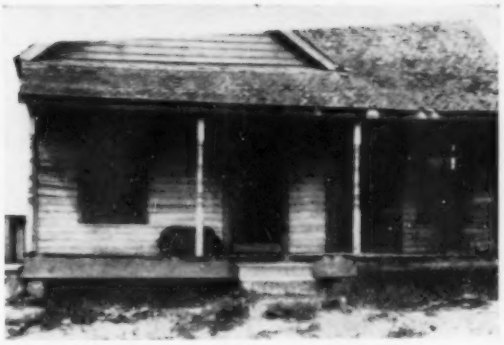
"Section 1. The Act of April 19, 1930 (46 Stat. 248) authorizing the Secretary of Agriculture . . . to investigate the ginning of cotton; to establish and maintain experimental ginning plants and laboratories; and to make such tests, demonstrations, and experiments, and such technical and scientific studies in relation to cotton ginning as he shall deem necessary and to publish the results thereof, with a view to developing improved methods, and he may cooperate with any department or agency, of the Government, any State, Territory, District or possession, or department, agency, or political subdivision thereof, or any person, as he shall find to be necessary.

"Section 2. That for the purposes of this act there is hereby authorized to be appropriated, out of any money in the Treasury not otherwise appropriated, the sum of $100,000 for the fiscal year ending June 30, 1931, and thereafter such sums as may be necessary."

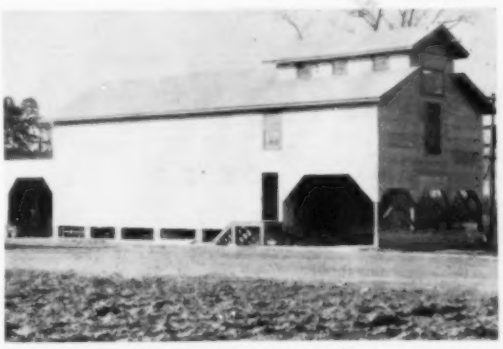
Thus the U.S. Cotton Ginning Research Laboratory, with only $100,000 for buildings and other requirements, had a rather meager start in 1930, but at least it was a beginning.

Soon afterward, the Bureau of Agricultural Engineering was established on July 1, 1930. The Secretary of Agriculture assigned the engineering responsibilities at the U.S. Cotton Ginning Laboratory in Stoneville to this new Bureau, and the fiber quality responsibilities to the Bureau of Agricultural Economics.

"Uncle Charlie" Bennett was ordered



THIS SHACK was the first office for Charles A. Bennett and Leo Gerdes and their staffs in 1930-31, while the laboratory was being built.



THIS COTTON HOUSE was built to house tools, equipment and supplies while the main lab was being built.

THE THREE-STORY Ginning Laboratory building shown here was built at Stoneville in 1930-31.

STONEVILLE

AN AERIAL VIEW of the present USDA Ginning Laboratory at Stoneville.

THE TWO BOTTOM SCENES show the complete 1932 staff of the Stoneville Laboratory. The engineering staff is on the left, the fiber technology staff on the right. The top picture shows the present Stoneville staff.

to start construction work at the site of the present laboratory. The five-acre site for the laboratory, on Delta Branch Experiment Station land, was officially deeded to the federal government by the late Theodore G. Bilbo, Governor of Mississippi.

Work began during July, 1930, on a cotton house which could first be used for housing tools, equipment and supplies. This construction was followed during the same year by the execution of the first three-story ginning laboratory building. Bennett built all he could with available funds and wisely planned for future expansion.

F. Leo Gerdes, now retired, was then a young graduate of Texas A&M College, who had spent two years in fiber research with Dr. R. W. Webb. He was assigned, in 1930, the job of heading up the cotton quality, economic and technological phases of work at the Stoneville Laboratory. Gerdes grew up at cotton gins, where his fathers and brothers were active in their ownership and operation near Sinton, Texas. He received his B.S. degree in agricultural administration at Texas A&M College, and worked in government classing offices and with Dr. Webb.

Mississippi in 1930-31 constructed a brick office and laboratory building across Deer Creek from the Ginning Laboratory grounds. This Delta Branch Experiment Station building provided space for the offices, fiber and moisture laboratories of the U.S. Cotton Ginning Laboratory. Until this building was completed, however, Bennett and Gerdes maintained a USDA office in an Experiment Station tenant shack on the north bank of Deer Creek.

Bennett's first assistant at Stoneville, in 1930, was a good general mechanic, Melvin Williams, who had worked with him at Tallulah. Shortly thereafter, R. G. McWhirter, principal laboratory machinist, was transferred from the Navy Yards of Washington to assist Bennett.

Leo Gerdes' right-hand man at Stoneville in 1930 was George W. Pfeiffenberger, who is now executive vice-president of Plains Cotton Growers, Inc. of Lubbock.

Charles Scott Shaw, author of this article, reported for duty at Stoneville in time for the first testing season, in August, 1931. He was followed, in September, by William J. Martin, to work with Gerdes, and V. L. Stedronsky and R. C. Young, to work under Bennett.

Bennett and Gerdes worked fast in setting up organizations to start func-

(Continued on Page 49)

Here's why cotton seed treatment with Du Pont CERESAN® LIQUIDS is best

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OFFICERS AND DIRECTORS of SuPima Association were installed at the group's annual meeting in El Paso. Above, left to right, seated, are: Harry Moore, secretary; George Spence, treasurer; Frank Crews, vice-president; Newton Cooper, vice-president; and Mark Rickman, president. Standing, left to right, are Directors J. S. Francis, Jr., J. R. Pursley, Marvin Hayes and John Salopek.

SuPima Enters New Market

SPEAKERS at SuPima's annual meeting included, left to right: Clifton Kirkpatrick, director of field service, National Cotton Council, Memphis; Mrs. Mary Alice Stewart, sales promotion manager, SuPima Association, New York; Dr. Carl Feaster, Cotton Research Center, Tempe, Ariz., and V. L. Stedronsky, USDA Cotton Ginning Research Laboratory, University Park, N.M.

PROSPECTS for an expanding cotton market including extra long staple cotton, announcement of a new pima strain with higher yield, a possible breakthrough in ginning techniques for pima cotton and a movement by SuPima into the mass clothing markets were some of the subjects presented to nearly 400 growers at the seventh annual SuPima Association of America meeting held in El Paso recently.

Mark Rickman of LaMesa, N.M. was re-elected president of the Association, as were Newton Cooper of Casa Grande, Arizona and Frank Crews of Pecos, Tex., vice-presidents; George Spence of El Paso, treasurer, and Harry Moore of El Paso, secretary.

New directors include Paul Harvey Jr., El Paso, filling the vacancy of George Payne, El Paso, and J. S. Francis Jr., Peoria, Ariz., serving the unexpired term of J. Clyde Wilson of Buckeye, Ariz., who resigned to give full attention to his office as president of National Cotton Council.

Wilson set the keynote for the meeting with his picture of a stable world-wide cotton industry. He said that for the first time there was a balance in the world-wide cotton industry.

"We are no longer beset by the problems of excessive supply. This is due to the expansion of world-wide consumption of cotton through promotion and the other is a halt to expansion of world production by more reasonable prices," Wilson said.

Clifton Kirkpatrick, field service director, National Cotton Council, echoed Wilson's remarks. However, he warned about the increasing manufactured textile imports.

Advantages of the new extra-long staple variety, Pima S-2, were described by Dr. Carl V. Feaster, plant breeder at the Cotton Research Center in Tempe, Ariz. The strain, officially released last September by USDA, is a satisfactory replacement for Pima S-1.

Feaster described S-2 as a higher yielding, higher gin turnout, faster ginning, better germinating, shorter, more compact plant, with satisfactory fiber properties and spinning performance.

New ginning techniques at an experimental gin, designed to increase gin capacity of the extra long staple five times over present capacities, were reported by V. L. Stedronsky, engineer in charge, USDA Cotton Ginning Laboratory, University Park, N.M.

Termed as a "flight bar gin" the gin uses a series of bars instead of a knife for the ginning procedure.

This gin will be tested commercially this year, says Stedronsky.

Movement of SuPima products into mass markets was reported by Mrs. Mary Alice Stewart, promotional manager for the organization. She outlined some high fashion markets into which SuPima is now being accepted and told of future promotions.

Miss Linda Lackey, 1961 Maid of Cotton, was presented with a car coat made of SuPima cotton at a luncheon at which time new styles in SuPima were modeled in an informal show.

American Cotton Congress | Plans Made For Annual Meeting in Lubbock May 8-9

ALL SEGMENTS of the cotton industry were represented at the planning session of the American Cotton Congress program, scheduled for Lubbock, May 8-9.

"Current plans call for Secretary of Agriculture Orville Freeman to speak at the Congress' dinner banquet May 8.," Burris Jackson, chairman, told the group.

Plans for the two-day affair will follow a general outline of national policy discussions and speeches Monday morning; cotton production with emphasis on the cost-price squeeze, Monday afternoon.

Tuesday morning's session will stress cotton marketing and merchandising.

Dr. Charles Meadows, Waco, is chairman for the marketing and merchandising section of the program; C. B. Spencer. Dallas, chairman of the production section and Bill Brumley, Texas Tech, is in charge of exhibits.

Definite program outlines will be published in The Press as soon as information is available.

COMMITTEE HEADS for the American Cotton Congress program confer with Col. Burris C. Jackson, Congress chairman, right, following their session in Dallas recently. Committee heads are, left to right, Dr. Charles Meadows, Waco, merchandising section; Bill Brumley, Texas Tech, Lubbock, exhibits; and C. B. Spencer, Dallas, production.

National Ginners To Meet with Louisiana-Mississippi Ginners

SELECTION OF NATIONAL Ginner of The Year is one of the items slated for National Cotton Ginners Association, currently meeting in Vicksburg prior to the March 22-23 convention of Louisiana-Mississippi Cotton Ginners.

As hosts to the National Board, the Louisiana-Mississippi group has arranged a full technical program and entertainment schedule for their two-day meeting.

Quality cotton at a profit will set the pace for the business sessions, featuring talks by outstanding leaders in cotton research and technology. Scheduled speakers include: T. M. Waller, agronomist, State College, Miss., who will discuss low cost production; J. L. McVey, head, agricultural engineering, Mississippi Extension Service, speaking on mechanics of production; and Clyde P. Bryson, agricultural engineer, Mississippi Extension Service, discussing harvesting for quality.

A research team from USDA Cotton Ginning Laboratory at Stoneville will outline the overall ginning program of the laboratory and discuss research dealing with gin stands, lint cleaning and moisture control. The team, headed by Vernon P. Moore, will include Oliver L. McCaskell, Edsel A. Harrell, Charles S. Shaw and A. C. Griffin.

A sight-seeing tour of ante-bellum homes, the national park and other points of interest in the area has been planned for the ladies. A highlight of the convention will be the annual banquet aboard the Sternwheeler Sprague, including a special performance by the Dixie Showboat Players.

Current officers of Louisiana-Mississippi Cotton Ginners Association are: President Eugene Fisackerly, Blaine, Miss.; Vice-Presidents Dan Foose, Thornton, Miss., and Dan Logan, Gilliam, La.; Treasurer G. M. Lester, Jackson, Miss.; and Executive Vice-President, Gordon W. Marks, Jackson, Miss.

National Cotton Ginners Association officers are: President C. A. Harvin, Summerton, S.C.; First Vice-President J. H. Williams, Natchitoches, La.; Second Vice-President J. S. Francis, Sr., Phoenix; Third Vice-President J. S. Morrison, Fort Worth; Secretary-Treasurer Carl Trice Williams, Jackson, Tenn.; and Executive Vice-President Tom Murray, Decatur, Ga.

Texas Ginners Program Set for Convention

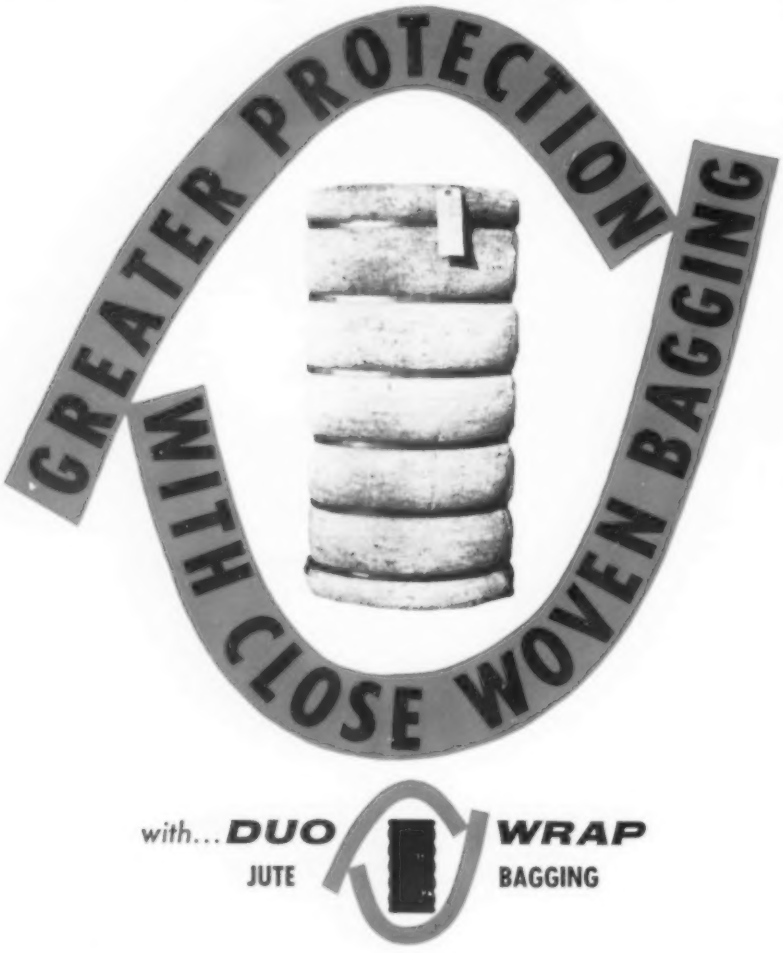
■ BOASTING EXHIBITS valued at over $2 million and speakers lauded across the nation and state, Texas Cotton Ginners Association expects 5,000 plus ginners and their wives to flock to Dallas for the 1961 Convention.

Speakers include Honorable James O. Eastland, United States Senator from Mississippi, Honorable Will Wilson, attorney general of Texas, and Dan Blount, of the International Shoe Co., known as the "man who put laughter into the safety program."

Also on tap is the annual cotton style show, a house-packer in other years. This year's show is up to the high standard of its predecessors and will be presented by Volk Bros. of Dallas, says Ed Bush, executive vice-president of TCG.

Registration will begin Sunday, April 9 and the official convention will end with a dance Tuesday evening, April 11, at the Statler Hilton.

■ **DONALD VAUGHN of Anson County, North Carolina, has been awarded a $500 scholarship by Atlantic Cotton Association for being named top 4-H Club cotton producer in North Carolina.**



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HEADING ARKANSAS-MISSOURI GINNERS ASSOCIATION for the coming year will be, above, left to right, Lon Mann, retiring president and new member, board of directors; W. F. Sikes, Sikeston, Mo., president; Jack Dante, Dumas, Ark., first vice-president; Rupert Blalock, Paragould, Ark., second vice-president, and Kemper Bruton, executive vice-president.

Midsouth Groups Elect Sikes and Mann

GINNERS from the tri-state area of Arkansas, Missouri and Tennessee gathered in Memphis for the tenth annual Midsouth Gin Supply Exhibit and two participating gin association conventions, March 12-14.

Memphis' Midsouth Fair Grounds was the focal point of the exhibits and talks for the ginners and other allied industry leaders, while Hotel Peabody was the gathering place for entertainment and social activities.

Officers for the new year were chosen at meetings held Sunday evening in the Peabody.

Pat Mann of Brownsville, Tenn., was chosen president of the Tennessee Ginners Association, replacing Waring Hazlehurst of Bemis, who was named as a three-year delegate to the Universal Cotton Standards Conference.

Other officers named at the meeting include Allen Robertson of Ridgely, vice-president and Harold (Pete) Williams of Jackson, renamed secretary-treasurer of the organization.

Five new directors were named. These are Leslie Agee of Bells, Ross Jackson of Minor Hill, L. H. Shaw of Ridgely, C. E. Bowers of Cordova and R. B. Coalder of Hickman, Ky.

J. H. McCraw, Mason, Tenn., was named delegate to National Cotton Ginners Association for a three-year term.

• **Arkansas-Missouri Officers** — At the same time, Arkansas-Missouri Ginners were picking their officers for a new year.

W. F. Sikes of Sikeston, Mo., was named president of the Association.

Aiding Sikes during the coming year will be Jack Dante, Dumas, Ark., first vice-president; Rupert Blalock, Paragould, Ark., second vice-president, and Kemper Bruton, Blytheville, Ark., renamed executive vice-president.

Lon Mann, Marianna, Ark., is retiring president of the Arkansas-Missouri Ginners and was named to the board of directors.

Exhibits at the meeting included displays by 52 companies and organizations.

Ed Bush, executive vice-president of Texas Ginners Association, kicked off the speaking program of the meeting with his gin safety address Monday morning.

He was followed by Edsel Harrell, USDA Ginning Laboratory, Stoneville, who urged ginners to make more efficient use of available power, and John Paul Jones, Missouri congressman, who told the group of recent and impending legislation affecting agriculture.

Monday night, ginners met with their respective organizations for presentation of the new officers and a banquet. Retiring presidents were given mementoes of their service.

Tuesday morning's talks included a recap of ginning research, past and present, by Vernon Moore, USDA Ginning Laboratory, Stoneville; quality preservation effort from the spinner's viewpoint, presented by Ernest Carpenter, Greenwood Mills, Greenwood, S.C., and cotton's outlook, given by Dr. M. K. Horne, chief economist, National Cotton Council. Council.

Following the final afternoon of exhibits Tuesday, the convention closed with a dinner-dance.

TENNESSEE GINNERS OFFICERS AND WIVES—Two echelons of "bosses" for the Tennessee ginners are pictured above prior to their being presented at a banquet during the annual convention at Memphis. They are, left to right, Mr. and Mrs. Harold (Pete) Williams, Jackson, secretary-treasurer; Mr. and Mrs. Pat Mann of Brownsville, president; Mr. and Mrs. Allen Robertson of Ridgely, vice-president.

James A. Moss New Cotton Director

James A. Moss has been named Director of Cotton Division, Commodity Stabilization Service, effective March 3.

Moss, a native of Earle, Ark., received his B.S. degree from Southwestern College, Memphis, and a LLB degree in 1940 from George Washington University in Washington.

He joined USDA in 1934 with the old AAA (Agricultural Adjustment Administration) and transferred to the office of the general counsel in 1945 to work on cotton and related programs.

In 1955 he went with the Cotton Division and was appointed deputy director in 1958.

Peanut Support Price Up

The minimum price support for peanuts has been raised to $221 per ton, representing 85 percent of parity.

Support for the 1960 crop was $201.24 per ton, 78.6 percent of the parity level in August.

Secretary of Agriculture Orville Freeman also has announced that deductions from grower support prices for inspection, grower association expenses and monthly storage—which totaled nine dollars per ton in 1960—will be eliminated.

• Funeral Services Held For B. L. Anderson

FUNERAL SERVICES were held March 13 in Fort Worth for Bernie L. Anderson, 82.

Anderson was an active participant in cotton business in Texas and in the nation for 60 years.

He was instrumental in the organization of the National Cotton Council and was serving as a vice-president at the time of his death.

He was a former president of the Texas Cotton Association and was to have been honored by the organization at its fiftieth anniversary meeting March 18 in Houston.

A graduate of Bingham Military School in North Carolina, Anderson was the son of Neil P. Anderson, founder of the cotton shipping and merchandising firm that bears his name.

Anderson was a member of St. Andrews Episcopal Church and active in many civic and cotton organizations.

He is survived by one son, Neil P. Anderson, II of Fort Worth; two daughters, Mrs. Jane Canning of Fort Worth and Mrs. R. B. Cooke of Baltimore, Md.; three grandsons and three great grandchildren.

■ **ROBERT HINES has been named manager, Clovis-Sanger Cooperative Gin, near Fresno, Calif.**

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eliminates fire hazard; means *lower* insurance rates (compared to wood and iron-clad seed houses)! Little or no maintenance is required! No danger of cave-in from rotting timbers!

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for *safety* and *convenience!*

4. EXCLUSIVE RACK AND PINION ACTION HOPPER DOOR

features large (42"x 32") free-flow opening in each hopper. Makes it easier, quicker, far more efficient to load out seed.

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Shipped in compact KD (knocked-down) package. Shipping weight: 20,000 pounds. (Double hopper model).

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Wonder State Seed Houses are pre-punched for quick and easy installation of custom seed hopper, and shed for trailer storage!

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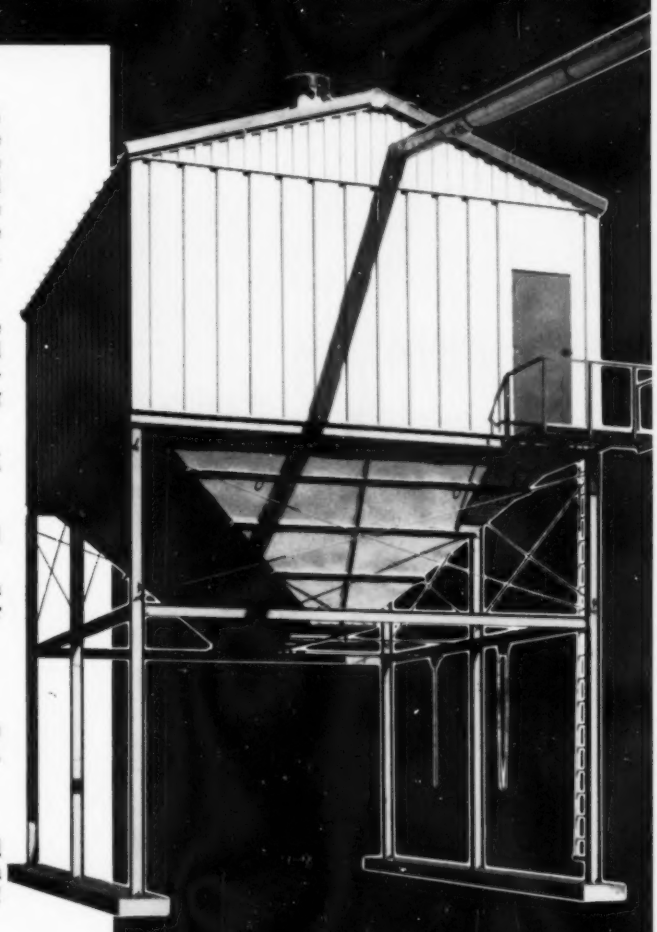
Store valuable planting seed without delinting or treating. Also ideal for grain storage. Safe from rodents.



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■ Deadline for Trading Rule Changes Nears

PROPOSALS TO CHANGE, or amend, National Cottonseed Products Association trading rules must be submitted to the secretary 30 days prior to the annual convention — no later than April 15 — warns John F. Moloney, secretary-treasurer.

Changes must be written out fully for consideration by the rules committee.

• Ivan J. Campbell Named Assistant to President

DICK HAUGHTON, JR., president of Haughton Publishing Co., publishers of The Cotton Gin and Oil Mill Press, has announced the appointment of Ivan J. Campbell as assistant to the president. The action was taken by the parent company's board at its annual meeting.

Campbell came to the company in 1931 and was editor of The Press for a number of years until 1955, at which time Walter B. Moore was named editor. Moore's resignation to join The Dallas Morning News was announced in the February 18 issue of The Press. Moore's successor is Dave McReynolds.

IVAN J. CAMPBELL

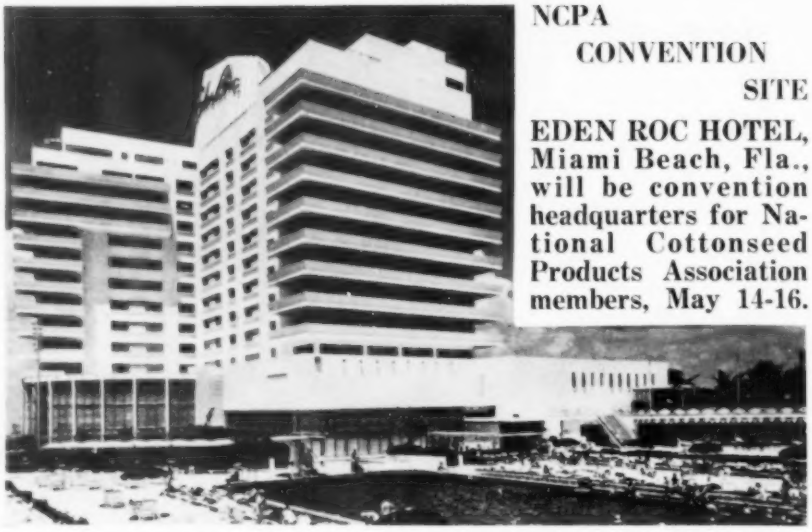
At its meeting the directors reelected the following officers: R. Haughton, board chairman; Dick Haughton, Jr., president; George H. Traylor, executive vice-president and secretary-treasurer; Ivan J. Campbell, vice-president; B. P. Ridgway, vice-president and general superintendent. R. Haughton, Dick Haughton, Jr., Traylor, Ben W. Haughton and Campbell comprise the board of directors.

Purina Offers Scholarships

A total of 54 seniors in colleges of agriculture across the nation will be completing their college work with the assistance of a $500 Purina scholarship.

These scholarships are awarded annually to one incoming senior student at each of the 50 land grant colleges in the U.S., three Canadian agricultural schools and one college in Puerto Rico.

Since the program's inception, seven years ago, 319 students have received scholarships.



NCPA CONVENTION SITE

EDEN ROC HOTEL, Miami Beach, Fla., will be convention headquarters for National Cottonseed Products Association members, May 14-16.

Production Emphasized

Blackland Plan Gets Public Airing

A program designed to brighten the farm income picture in the Texas Blacklands was presented to Dallas Agricultural Club members and guests at a recent meeting.

Over 400 farmers, bankers and others interested in agriculture in the 42-county area attended the luncheon at the Adolphus Hotel in Dallas.

Proposing a "package" program which would work through the county agricultural agents, Dr. R. E. Patterson, dean of agriculture, Texas A&M College, College Station, told the group "we think we have the technical and research program needed, if you can get the people interested."

Dr. R. D. Lewis, Experiment Station director and John Hutchinson, Extension Service director echoed the proposal and outlined how their branches would work with such a plan.

A question and answers session followed, with C. B. Spencer, agricultural director, Texas Cottonseed Crushers Association, moderating.

Mill Tours Planned

Five area mill tours are planned by cotton ginners and county agricultural agents in North Carolina during March and April.

Growers and ginners have a chance at an on-the-spot look at quality factors in spinning operations during the tours.

Mills to be visited are Morgan Mills, Laurinburg; Erwin Mills, Dunn; Borden Manufacturing Co., Goldsboro; J. P. Stevens & Co., Roanoke Rapids and Cannon Mills Co., Kannapolis.

Tour sponsors include American Cotton Manufacturers Institute, North Carolina Extension Service and North Carolina Cotton Promotion Association.

■ **EARL H. HANSON, formerly with Archer-Daniels-Midland Co., Minneapolis, has joined the products control section of the research division of Allied Mills, Inc., with headquarters in Libertyvill, Ill.**

• Final Rites Held For A. G. Falk

FUNERAL SERVICES for A. G. Falk, retired Mobil fleet district manager, were held March 7 in the Cook Funeral Chapel in Austin.

Burial was in the Oakwood Cemetery.

He died Sunday in a Waco hospital following a brief illness.

Falk, who had served as secretary of the Gin Machinery and Supply Association of Dallas, was honored by Texas Cotton Ginners Association and Gin Machinery and Supply Association in January when he formally retired after 28 years of working with ginners and gin supply representatives at Texas ginners' conventions. He retired from the Mobil organization effective March 1.

A native of Austin, Falk attended the public schools there and St. Edwards University. He was a veteran of World War I.

Entering the oil business in 1923 with the Pierce Oil Co. of Austin, he joined the Mobil organization two years later where his career was spent in the marketing division. He served as assistant district manager in Waco from 1932 to 1934, when he was transferred to Dallas.

A member of the City Temple Presbyterian Church, Falk was active in the Dallas Athletic Club, Dallas Country Club, Salesmanship Club and Dallas City Traffic Commission. He was a Mason and member of Hella Temple of Scottish Rite.

Survivors include his wife; father, G. H. Falk of Austin; three brothers, Bibb Falk and Chester Falk of Austin and C. O. Falk of San Antonio, and a sister, Miss Elsie Falk of Austin.

Weed Control in Cotton

Weed control in cotton was discussed in two reports at the California Weed Conference, held in Fresno County recently.

The speakers, Jack Hurt, assistant manager, California Planting Cottonseed Distributors, and Jack Miller, weed specialist, U.S. Cotton Field Station, Shafter, Calif., pointed out the increasing need for control, as weeds cost California farmers over one million dollars per day.

Improved Production Stressed At 1961 Western Conference

■ Meeting competition at home and abroad discussed by production leaders in Phoenix, March 7-8.

OPPORTUNITIES for improving cotton production and the ability of the crop to meet competition at home and abroad were emphasized by speakers at the Western Cotton Production Conference in Phoenix, Ariz., March 7-8. Ramada Inn was headquarters.

"Efficiency-Quality" was the theme of the Conference, sponsored by National Cotton Council and Southwest Five-State Cotton Growers Association, in cooperation with many other federal, state and industry organizations associated with cotton. Local hosts were Arizona Cotton Growers Association.

The following material, presented at the Conference, will be reprinted and distributed by the National Cotton Council and other sponsors as the official Summary-Proceedings of the Conference:

Opening Statement

■ **DAN W. CLARKE,** President, Arizona Cotton Growers Association, Tucson.

I'm pleased to see this good group here for the opening of this conference. I think it's a good example of the desire for further improvement on the part of Western cotton producers—a desire which has been so instrumental in bringing our production to its present level of technology and to its present level of prominence in U.S. cotton production, as well as the world market.

I think it goes without saying that Western producers as a whole have done a good job. We've been able to produce a quality fiber demanded by our mill customers. It's particularly significant we've ever received a premium for our cotton.

At the same time, we've been able to take some positive, and rather sizeable, steps in cutting cost and increasing yields. I think most of us can remember that even as late as 10 years ago when when the first of these annual conferences was held we were just getting yields up to a bale and a quarter and a bale and a half an acre—and mechanical harvesting, along with some other mechanized aids, was being used only on a limited acreage.

Room for Improvement

I don't think any of us would want to reverse our direction and retrace our steps to that backward situation. But by the same token, we would by no means become advocates of complacency and be content with staying where we are. By no stretch of the imagination have we reached the ultimate in the quality of fiber we can produce—or in the level of efficiency that it's possible to obtain. We can never afford to be content with a "status quo."

Let's look at some areas where we definitely need to make some gains.

What about diseases? We still have a lot of work to do before we can write this one off as past experience. And weed control—we've come a long way with this problem, but we still haven't run out of room for progress. In fact, a couple of new problems have been introduced. For example, chemicals have been a big help in getting rid of the hoe. But at the same time we've run into trouble with drift and residue hazards.

Another big question facing Western producers is how to conserve our water in order to get maximum yield and quality with a minimum amount of water.

And what about the chance for providing a better quality fiber that will bring us increased markets? I don't think any of us would want to stand still. In view of effort being exerted by the rest of the Belt, we'll be left behind if we do. We still need to learn more about preserving quality, particularly in mechanical harvesting since it's so prominent in the West, and in ginning this rougher cotton.

These are just a few areas where we can hope to find some answers that will propel us forward at an even faster rate in the future—and these are just a few of the subjects to be covered on the program of this conference.

I think we have a good program in store and an excellent group of participants to present it. I, for one, am optimistic about the opportunities before us for producing a better quality fiber—and for producing it more efficiently. If this conference can outline some of these opportunities and impress upon us the need for capitalizing on them, it will certainly have been successful and worthwhile.

Stand Improvement by In-Furrow Treatments

■ **DR. R. H. GARBER,** Plant Pathologist, ARS-USDA, U.S. Cotton Field Station, Shafter, Calif.

In recent years a great amount of effort has been expended in the search for ways to control seedling diseases. Certainly our knowledge has been increased. But last year U.S. cotton growers lost an estimated $75 million because of failure to establish a healthy stand.

TWO LEADERS who participated in the Western Cotton Production Conference at Phoenix are pictured here, discussing plans. Dr. M. K. Horne, chief economist of the National Cotton Council, left, was a featured speaker. E. S. McSweeny is executive secretary of Arizona Cotton Growers, local hosts.

If we have learned to control seedling diseases, it is obvious this information was not being used by many growers.

Seedling diseases may occur before seed germinates, as seedlings push toward the soil surface, or after they have broken through the soil surface. During cool, damp weather, seed are slow to germinate and seedling growth is retarded.

Such conditions are favorable for growth and parasitic activities of many pathogens. They are able to develop more rapidly at a much lower range of temperatures than the cotton plant. Thus, during cool, wet periods seed may completely rot without germinating or seedlings may damp-off before they reach the soil surface. Seedling diseases occurring prior to emergence are referred to as pre-emergence damping-off.

Post-emergence damping-off refers to the death of seedlings after they reach the soil surface. This usually occurs before the first true leaves develop, but sometimes continues for a month or longer after emergence.

Seed Treatment Helps

Fortunately, fungicides applied properly as seed treatments have been very effective in reducing seed decay by seed-borne and soil-borne pathogens. Current seed treatment fungicides have been less effective in protecting young seedlings as they push toward the soil surface, and are relatively ineffective in preventing post-emergence damping-off. Where conditions have been particularly favorable for seeding diseases, additional protection may be warranted.

Experiments have shown a higher level of protection possible if certain selected fungicides are applied to the seed furrow during planting. These chemicals have been applied various ways, as both dusts and sprays. Some growers have simply added a fungicide dust to the seed in the planter hopper. The dust is distributed in the soil along with the seed. Called hopperbox treatment, this has, in some instances, given a degree of protection not ordinarily obtained with seed treatments.

Some growers have attached spraying or dusting equipment to their planters and applied fungicides to the seed furrow and covering soil at planting time. This practice has been widely adopted in some areas. For example, in California, fungicides are applied in the seed furrow on about one-fifth of the planted acreage.

Whether fungicides are applied to seed, in the hopperbox, or by specially designed row treatment equipment, objectives are essentially the same.

Combinations Show Promise

Seedling diseases of field crops, such as cotton, are frequently caused by a combination of two or more fungi. Many of these pathogens occur throughout the cotton-growing areas of the U.S., but others are peculiar to a particular section of the country. Some are introduced into the soil on seed or by other means, but most are commonly present in soils in which cotton is grown. A few attack cotton almost exclusively, while others are pathogenic on a wide variety of plants grown in rotation with cotton.

Control of seedling diseases by fungicides has been limited because most fungicides are not as effective against some organisms as against others. Along with the chemical industry, we are searching for the ideal fungicide which would be effective against a wide group of organisms.

The 1962 Western Cotton Production Conference will be held March 6-7 in El Paso.

Some chemicals have looked promising, but none have approached the degree of control we desire. Trials in the greenhouse and in the field in California have demonstrated that combining fungicides which control different fungus offers some promise of an increased level of protection from seedling pathogens.

Greenhouse trials with sterilized soils artificially infested with specific organisms help illustrate the selective activity of certain fungicides. Fungicides were applied as seed treatments. Ceresan 100 represented commonly used commercial seed treatments. Dexon, an experimental fungicide, and PCNB also were used. Seeds were planted in soils infested with Pythium ultimum, Rhizoctonia solani and a combination of the two.

In Pythium infested soil, Ceresan 100 and Dexon gave superior emergence and survival as compared to non-treated and PCNB treated seed. Dexon was highly effective against Pythium. In Rhizoctonia infested soil, non-treated and Dexon treated seed had a very poor emergence, and all seedlings died following emergence. Ceresan 100 produced a good emergence count and a fair surviving stand. PCNB demonstrated superior activity against Rhizoctonia in this trial. When a soil was infested with both Pythium and Rhizoctonia none of the treatments gave satisfactory emergence or survival.

The next step was to combine materials such as Dexon or Ceresan 100, which were effective against Pythium, with PCNB which had given excellent protection from attack by Rhizoctonia. The combination fungicides containing Ceresan 100 or Dexon were far superior to non-treated or Dexon treated seed in Pythium soil. In Rhizoctonia soil all treatments contained PCNB, and all performed very well compared to the non-treated. In Pythium and Rhizoctonia infested soil the combination treatments containing fungicides with specific activity for both Pythium and Rhizoctonia gave excellent emergence with little post-emergence death loss.

Field Trials Give Results

One field trial from our 1960 tests illustrates the performance of combination fungicides in the field. Non-treated and either of the single seed treatments PCNB or Dexon had poor emergence, and many plants died leaving unsatisfactory stands. Panogen seed treatment produced fine emergence but high post-emergence death loss. Combinations of PCNB with either Captan, Ceresan 100, Dexon or Panogen produced fair stands and lower post-emergence death losses than any single fungicide.

Combining specific fungicides as in-furrow fungicides involves the same principles of seedling disease control.

In one of our early trials with in-furrow fungicides in California, Ceresan M was used on all seed. Ceresan M used without the addition of a soil fungicide gave fair emergence but over half the stand was lost through post-emergence death loss. When Captan was applied into the seed furrow there was an improvement in emergence and survival over seed treatment alone, but post-emergence disease left an inadequate stand. The addition of Captan to PCNB in the furrow appeared to provide no advantage over the addition of PCNB alone. It would appear that in this trial Ceresan M seed treatment provided what protection was needed from Pythium, and the additional protection of Captan in the furrow was not needed. PCNB in this trial gave excellent protection from pre-emergence loss from Rhizoctonia.

In the second trial, conducted the following year, in-furrow treatments were applied without the benefit of Ceresan M seed treatment. Ceresan M treatment improved the emergence and survival when compared to no treatment. Captan soil treatment gave a good emergence but did not prevent post-emergence death loss. PCNB without Ceresan M seed treatment in this trial provided poor emergence and survival. Addition of Captan to PCNB in the furrow produced an excellent stand with a minimum of post-emergence loss. Once again it was necessary to have fungicides active against both Pythium and Rhizoctonia in one treatment to get and maintain the desired stand.

In still a third trial Ceresan M seed treatment alone or in combination with Captan row treatment provided only fair emergence and stands were seriously reduced by post-emergence losses

Again, PCNB in the furrow, in addition to Ceresan M on the seed, just gave as much protection as Captan and PCNB in the furrow. It appears that in this trial Ceresan M again provided as much protection from attack by Pythium as was needed. Combinations that offered protection from both Rhizoctonia and Pythium also provided and maintained good stands.

In the final trial, a single seed treatment was compared to a combination seed treatment. These may be compared with single and combination row treatments. Disease in this location was not serious, so seed treatment provided adequate emergence and survival. The combination seed treatment that provided excellent emergence and survival in the seed treatment trials, Dexon plus PCNB, gave better emergence and survival than Captan seed treatment alone. As an in-furrow treatment, Dexon and PCNB appeared to give better emergence and survival than Captan with PCNB. When seed were treated with Dexon alone and only PCNB was dusted in the row, results were nearly as good as when both fungicides were dusted into the row. Again, if protection from both Pythium and Rhizoctonia was present in a treatment, excellent emergence and survival was evident.

Depends on Grower's Needs

Results from both greenhouse and field trials with seed and soil treatments indicate the possibility of improving the protection of cotton from seedling diseases by the use of combinations of fungicides that are specific but highly effective against the individual pathogens involved. It has not been possible to predict the amount or severity of seedling disease that might be expected in any given field. Therefore, the decision whether to use seed treatment or some form of soil fungicide will depend on the level of protection desired by the grower. In-furrow soil fungicide applications offer a much higher level of protection from seedling diseases than seed treatments. Hopperbox applications ap-

pear to provide a level between seed and in-furrow treatments.

We may not be able to stop the $75 million annual loss to seedling diseases, but if we better understand some of the principles involved in controlling seedling diseases we can more intelligently formulate an effective control program.

Nematode Control

■ **DR. H. W. REYNOLDS,** Nematologist, ARS-USDA, Cotton Research Center, Tempe, Ariz.

The cotton root-knot nematode, a microscopic round worm, is a troublesome pest of both short and extra-long staple cotton in the Southwest. The parasite enters tiny roots and feeds on internal tissues, which results in a knotted or galled root system. These galls interfere with the movement of water and nutrients within the plant. This causes the cotton plant to wilt temporarily, especially during the heat of the day.

The root-knot nematode is a debilitating, rather than a lethal, pest because the cotton plant seldom dies outright from the nematode only. However, when the root-knot nematode is associated with certain damping-off fungi, a high mortality rate may occur in the seedling stage.

Soil Texture Big Factor

Soil texture is the most important environmental factor affecting the root-knot nematode-cotton relationship. Nematode damage to cotton is restricted to the coarse textured, sandy loam soils. Fine textured loam soils are not favorable to the development of this parasite on cotton.

Soil temperature is also an important factor affecting this pest. Optimum soil temperature for its development is 81 degrees Fahrenheit, but the parasite will enter the roots and damage the plant at temperatures somewhat above or below 81 degrees. In fact, the nematode will enter the roots at temperatures favorable for cottonseed germination.

Egg masses and larvae of the root-knot nematode are disseminated in the cotton row and from field to field through irrigation water. Also farm machinery is a means of dissemination within a field as well as from field to field in soil adhering to farm implements.

Extra-long staple varieties are more susceptible to the nematode than most short staple varieties. However, the short staple variety, Deltapine, was observed to be very susceptible in 1960 to the pest under Arizona conditions.

Three Control Measures

There are three effective and practical means of controlling the cotton root-knot nematode: crop rotation, summer fallow, and soil fumigation.

Rotation of cotton with a variety of alfalfa highly resistant to the cotton root-knot nematode (such as African, Chilean and Moapa) for two or more years has proved to be a good method of reducing root-knot populations on the following cotton crop. In addition, this rotation maintains soil fertility at a high enough level for good cotton yields. A one-year rotation of small grains grown during the cool months, followed by grain sorghum in the summer, has also reduced root-knot nematode damage to the cotton crop the next year.

Root-knot nematodes are controlled effectively if the land is kept completely fallow during the hot summer months with an occasional disking. This eliminates weeds on which the nematode can feed, and keeps the upper eight-nine inches of the soil dry and unfavorable for nematode survival. However, some growers cannot justify fallowing their land because of limited acreage or other factors whch might disrupt their plan of operation.

Where it is not practical for growers to rotate crops regularly or to practice summer fallow for root-knot control, soil fumigation has given very good results on fields planted to cotton year after year. Soil fumigants have usually been applied with four-row, eight-chisel injection equipment on a row-placement basis. The chisels are usually set so as to deliver two lines of fumigant five to six inches from the center of each listed bed. The fumigant is injected approximately eight inches below the normal soil surface level. An advantage of the row placement method is that it requires only one-half to two-thirds the amount of fumigant as overall or area treatment. A disadvantage is that cotton stalks and roots of the previous crop may be present and interfere with the application by collecting around the chisel points.

A recent practice which has shown promise under certain conditions is the application of an emulsifiable fumigant in irrigation water. The chemical is metered into the water at the time of pre-planting irrigation.

Recent experiments conducted in the

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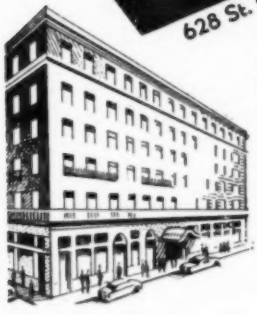

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greenhouse and in field plots have shown cotton root-knot nematode can be controlled effectively by placing a soil fumigant on cottonseed. The chemical is first placed on an inert carrier. This mixture is held on the seed with a sticker. Further studies will be conducted with different cotton varieties, rates of application, and in different locations before this practice can be recommended commercially.

Research Findings In Weed Control

■ **H. FRED ARLE,** Agronomist, ARS-USDA, Cotton Research Center, Tempe, Ariz.

Established cotton is more tolerant to diuron than to monuron. Diuron also can be used more safely than monuron on soils having a relatively high sand and low clay content. As farmers have become accustomed to using the substituted urea compounds (monuron and diuron) for control of annual weeds in cotton, some changes in application procedure have gradually occurred.

Use of these compounds has enabled many farmers to advance their normal layby period. Instead of cultivating well into July, applications of diuron can often be made prior to the third, second or even first irrigation and maintain chemical control of annual weeds throughout the cotton season. However, these attempts to get a longer period of weed control at no additional cost for chemicals have not always been completely successful. Reported failures usually have come from farmers who used diuron on soils with a rather high clay content.

Best control of annual weeds has occurred when diuron applications have been followed by rainfall. Rain is especially important when treated soil has a high clay content. Increased effectiveness also has been demonstrated on experimental plots where diuron applications were followed by sprinkler irrigation. Apparently the leaching carries the chemical downward into the area of weed seed germination where it can be taken up by the roots of seedling weeds. In Arizona, little or no rain is received during May or June; therefore, diuron applications during this period do not have the benefit of desired precipitation.

Diuron sprayed onto the soil is subject to slow decomposition through the action of sunlight. We call this photodecomposition. The cotton plant, during its early development, provides a minimum of shade for the soil. Therefore, diuron which remains on the soil surface during this time is more subject to inactivation and may be reduced to levels sub-lethal for weed control.

Placement Offers Solution

The obvious answer to these problems is to place the herbicide where it can be most effective—in the area of germinating weed seeds. A simple procedure would be application to the soil surface followed by some technique which would incorporate the material with the surface soil. After cotton has emerged, soil incorporation of herbicides is not accomplished easily. Common farm equipment such as disks, harrows and other types of cultivation equipment generally do not accomplish adequate mixing of the herbicides. The problem is less complex when the chemical is soil incorporated prior to planting.

During the past four years experimental preplant applications of diuron have been successfully made on Upland cotton (Acala 44) in Arizona. Best results have been obtained from a broadcast application made prior to furrowing out for the preplant irrigation. Under this method the chemical is mixed into the bed and can be taken up by the roots of seedling weeds. Similarly, roots of seedling cotton plants are in contact with the herbicide and may absorb it. If a sufficient quantity is taken up the young plant may be severely injured or possibly killed. Most frequently, however, cotton seedlings show no effect or develop only slight chlorosis after the first irrigation. The growth and development of such affected plans is noticeably retarded. However, this is a temporary condition, not sufficiently severe to have an adverse effect on yield.

Preplanting applications have also been made after furrowing out but prior to the pre-irrigation. Applied at this time, diuron is not mixed with soil that later forms the seedbed. Therefore, it can have little or no effect on the developing cotton seedling. Also, because treated soil is harrowed to the side when the seedbed is formed, weeds are afforded an opportunity to establish themselves in the cotton seed row. These weeds frequently are of sufficient size to resist the chemical after it is moved back into the cotton row when irrigation furrows are established.

As in the case of post-emergence applications, rates of diuron vary with soil types. Soils high in sand and correspondingly low in clay content appear most hazardous. Relatively few experimental applications have been made on light soils and additional work is necessary before a discussion of results is warranted. Since diuron fails to control weeds most frequently when used on high clay content soils, it appears fortunate that our most promising results have occurred in this problem area. At the Cotton Research Center, topsoil of the experimental area consists of approximately 30 percent clay, 40 percent silt and 30 percent sand.

Excellent season-long control of broadleaved weeds (annual ground cherry) and annual grasses has resulted from preplant applications of diuron (80 percent material) at rates of 1.5 to 3.0 pounds per acre. However, some seedlings developed mild chlorosis and a few were injured sufficiently to cause death. In addition, there was a general but temporary retardation in the development of the seedling plants. Growth was not sufficiently delayed to have an adverse effect on yield.

Preplanting Hazards

Use of diuron as a preplanting treatment involves certain hazards to cotton plants not encountered with presently recommended layby treatments. Even when diuron is applied at the proper rate, we cannot always be assured of success. Certain other factors which are not controllable may affect the susceptibility of the seedling cotton plants. Some evidence indicates that the amount of soil moisture present at planting must be a consideration. When the planting is made while soil moisture is at a high level, seedlings are most susceptible. Planting should therefore be delayed until soil moisture is at the optimum level.

Rainfall sufficient to wet down to the area of root development while cotton is in the cotyledon stage could also result in the loss of plants. During the 1960 season we attempted to determine the effect of rainfall on young cotton plants growing in soil which had been previously treated with diuron. Half of each plot was left untreated. Beginning April 1 cottonseed was planted at three- to four-day intervals until eight plantings were made. By early May plants varied in size from four true leaves to that which had not yet emerged. At this time one-half inch rainfall was simulated by sprinkler irrigating for two hours. At each planting date there was some variation in seedling emergence, and a variability in plant age when the area was sprinkled. Plant counts were taken immediately prior to sprinkling, eight to 23 days after sprinkling.

Plants in the cotyledon stage when sprinkled were most susceptible to injury and a number of these growing in treated soil died. Plants in the cotyledon stage and growing in untreated soil also died during this period. It is assumed that these plants died because of infection by Rhizoctonia. Therefore, it is quite possible that plants on diuron treated soil could have died because of wilt rather than susceptibility to diuron. Plant counts made May 27 were about equal to counts of earlier dates. Although some plants died during the interval, the plant population remained constant because of delayed seed germination and the emergence of additional seedlings.

Preplanting applications of diuron had no effect on maturity of cotton, and total yields for each planting date were highest on the treated portion of each plot. Cotton yields of the first picking were approximately equal for treated and untreated areas (percent first picking times total yield). Due to weed competition on untreated areas, cotton yields of the second picking were substantially reduced.

Additional experimental work with preplant applications of diuron is planned for the 1961 season. Also, a number of farmers have indicated their intention of making preplant trials. It is strongly suggested that such applications are limited to a restricted acreage.

My Weed Control Plan

■ **ART PACHECO, JR.,** Producer, Marana, Ariz.

I am most happy to report on my weed control program because this is an area where I have definitely been able to lower my costs and, as a result, to help maintain our net income where it should be.

The two weeds that give us the most trouble are Johnsongrass and the annual morning glory. Gradually, Johnsongrass is being almost eliminated. In 1953 we had a $23 an acre hoeing cost, most of which was for chopping Johnsongrass. Actually this wasn't so bad, since Johnsongrass was so thick in many places that we used a renovator with sweeps to knock down the beds and cut out the grass so we could plant. We are in a water association and at that time the water company was still using men with scythes to cut the Johnsongrass on ditch banks. The men could never get around fast enough and the grass would go to seed. Naturally, in addition to the old established stands of Johnsongrass, we had a completely new stand of grass every time we irrigated, because the seed would float down our delivery laterals

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right onto our fields. This situation has been corrected. Johnsongrass on the ditch banks has been eradicated by spraying with weed oil.

We plant over 100 acres of skip-row cotton every year. Last year we tried spraying with Dowpon for the first time. I previously used a renovator with sweeps to clean out weeds in the skips, but spraying worked especially well last year and I plan to try it again. We found the field looked much better after renovating than after spraying with Dowpon, but after every rain a new crop of weeds would germinate. Dowpon leaves a shaggy appearance because dead weeds remain standing. However, we can live with this if our costs are lower in the long run.

Monuron Cuts Costs

The annual morning glory is an entirely different situation.

In 1954, it cost me enough money for hoeing that I was becoming quite concerned. Morning glories were worse in heavier soils, but were spreading rapidly because of our picking machines. It was at this conference in 1955 that I first heard of CMU, which monuron was called at that time. After investigating, I contracted to treat about 100 acres that summer of 1955. We had a bad hail storm on June 12 and decided to wait until after July 15 to make the application so the plants would be larger and chances for damage would be less. Weed control also would be better because of the shade from larger plants.

But because of rain we were never able to get in the fields with spray rigs. Morning glories almost ruined us. We averaged spending $34.20 per acre that year for hoeing. One field alone cost $56.11 an acre.

In 1956 we had the custom applicator put monuron on our fields for the first time. Costs of weeding went down to $20.20 per acre. We also had the herbicide applied by a custom operator in 1957, and our hoeing cost went down to $8.36 per acre. The monuron and application cost us $6 per acre more.

By the end of 1957, several farmers had used the material. Some said they had bad results. These rumors caused me to take another look at my weeding program. Verticillium wilt was becoming very prevalent in our area by that time and the advanced stages looked very much like monuron damage. We apply the material in early July and shortly afterward the first summer rains start. Soon afterward we noticed the first symptoms of Verticillium Wilt and because the application of monuron is so close to the time these discoloration symptoms appear many farmers are blaming the monuron.

I'm not saying you can't have damage because I believe besides getting damage from mistakes or carelessness some soils have to be treated more carefully. We had one field which had a very definite discoloration two different years we applied monuron. One year I believe we lost some plants in the cotyledon stage from the residual effect of the material. Last year we used diuron on this field with no effects on cotton.

Built Own Rig

I decided to continue our program and in 1958 the only change we made was to set up our own rig. By that time we knew enough about handling the material and have been applying it ourselves ever since. Last year our weeding bill was $10.10 per acre, including the cost of material and our cost of application. This is quite a difference from the $34.20 an acre spent for hoeing in 1955.

This material is not one to take lightly and apply carelessly. I still worry after applying it, but not half as much as when we had 50 to 100 men in the fields trying to hoe the morning glories and still not be able to control them. I'll put it this way: "I wouldn't want to farm without it now."

There is no particular secret to doing a good job with these materials. We have no expensive rig. We had a sprayer with a good mechanical adjutator, so by buying a high trailer and our booms, screens, and nozzles, we built a rig for less than $600, which has been doing a very good job for us.

Short Cuts Costly

The most important thing we have to remember is to use these materials according to the book. We've tried two short cuts to save money and it has cost us more every time. We've tried irrigating every other row and counting on rain to wet the other row enough to get results. There was no rain last summer and the field I tried this on cost me almost as much as the savings I was making on other fields on which I followed recommendations and irrigated every row. Luckily, I only tried this on a 17-acre field.

Up to lay-by, we use the conventional methods of cultivating and hoeing. We've been using the spring or rod weeders as soon as cotton is large enough to withstand the pressure, and they have helped tremendously to keep the morning glories down before lay-by. I tried another short cut here. I applied the material on a field not free of weeds. I had seen large morning glories die other years, so I though I would take a chance and save a hoeing. Most of the large morning glories turned yellow, but later in the summer they seemed to recover. It cost me quite a bit more later to weed these big vines so they wouldn't smother my plants completely.

The other mistake I've made is not covering enough space outside the outside row in skip-row fields. We did a better job last year by using a wider angle nozzle, but there is room for improvement.

In conclusion, I would like to say that following recommendations in my weed control program has helped maintain my net income at a favorable level and I would like to take this opportunity to thank the research people responsible for these recommendations.

Residue Problems In the West

■ **DR. H. L. HALLER, Assistant to Administrator, Farm Research, ARS-USDA, Washington, D.C.**

Insecticide residue studies were first undertaken in USDA in 1910. Considerable effort has been directed to preventing or minimizing pesticide residues on food crops, or removing them after harvest. However, the residues only recently have become a serious problem for the cotton industry.

This has come about for two reasons.

First, we are using a wider variety of insecticides on cotton. Secondly, the recently-passed Miller Amendment to the Food, Drug, and Cosmetic Act provides for the establishment of safe tolerances for pesticides that may remain as residues in or on raw agricultural commodities at harvest.

Under the Amendment, cottonseed has been determined to be a raw agricultural commodity. Therefore, if a pesticide residue is present in or on cottonseed, a tolerance, or an exemption from tolerance, must be obtained, because cottonseed meal and cake are used as animal feed and cottonseed oil in oleomargarine and in vegetable shortenings. Legal tolerances have been established for a number of pesticides used in cotton production.

Cotton growers are thus faced with the enormously difficult job of controlling an ever-growing number of insect pests on cotton—and at the same time keeping residues at a neglible level.

Drift Is Big Problem

Drift of pesticidal chemicals during application is one of the biggest and most difficult problems for cotton growers.

It may present a hazard to humans, livestock, beneficial insects, fish and wildlife, and nearby crops. It also may damage the crop itself—as cotton can be damaged when 2,4-D is applied to nearby rice fields.

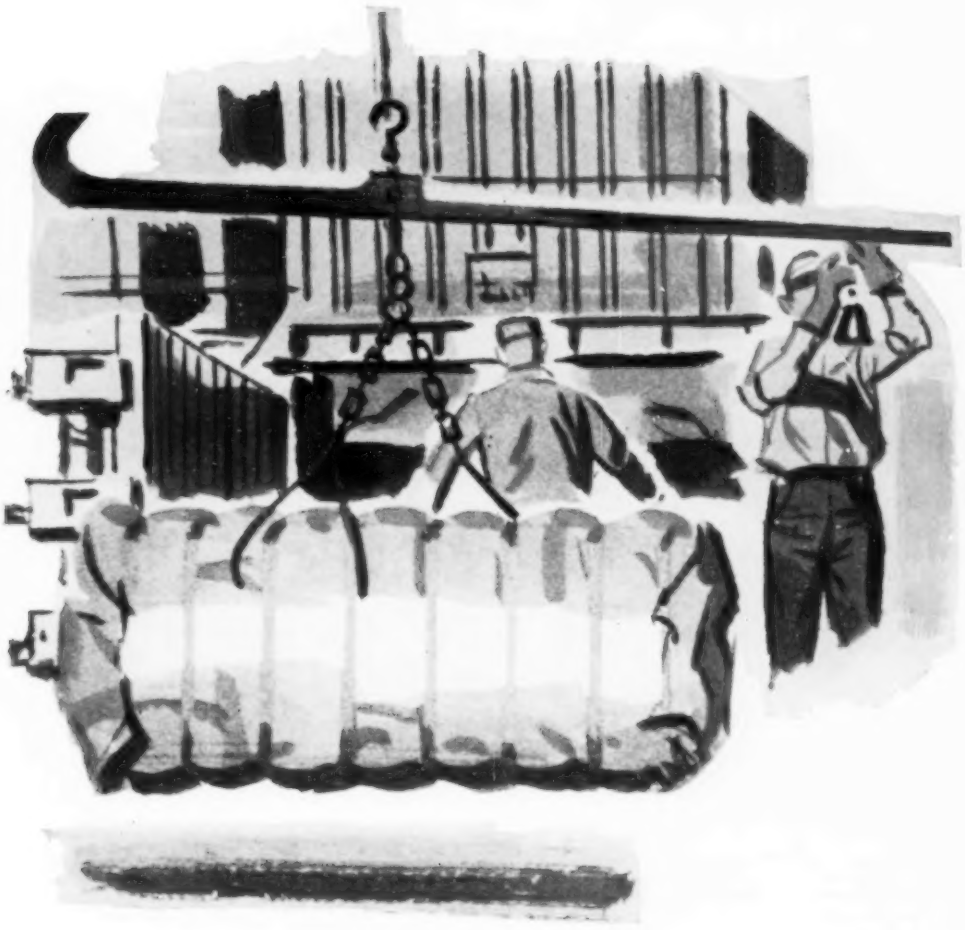
Another hazard of increasing importance is the possibility of drift imparting a persistent residue on a marketable crop. This is particularly important with fruits and vegetables, where there may be a zero tolerance for the pesticide being applied, or where no tolerance at all has been established for the crop.

An especially difficult problem is drift of pesticides onto pastures and feed crops. The quantity of drifted pesticides seldom affects the health of livestock. But residues on feed may contaminate the fat of meat animals or the milk of dairy animals.

Tolerances have been established for several insecticides in the fat of certain meat animals. But the present Food and Drug Administration policy establishes only zero tolerances for pesticide residues in milk. However, tolerances greater than zero are allowed for residues of many of the pesticides in other major foods. This policy is based upon the premise that milk constitutes the sole or major food of infants, young children, and sometimes of the aged and ill, and these groups may be more susceptible to toxic actions than are others.

Recently the Food Protection Committee of the National Academy of Sciences-National Research Council expressed the opinion that there is no evidence or reasonable basis for presuming that extremely small residues of pesticides in milk are peculiarly hazardous for the infant. An infant is given other foods deemed safe which may contain residues of pesticides. The committee believes it is unscientific to insist that to be safe for infants, cow's milk must be absolutely free of residues of pesticides permitted in other foods.

Complicating the entire residue problem is the fact that a tolerance for a pesticide cannot be established based on residues due to drift. For example, tomatoes and alfalfa may be grown in adjacent fields. If an insecticide for which there is a tolerance on tomatoes is applied to this crop, and some drifts onto the alfalfa on which there is no tolerance for the insecticide being applied, the alfalfa is subject to seizure if it moves



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A tolerance may be obtained on alfalfa for the insecticide applied to the tomatoes. To do so requires residue data based on a definite rate of application of the insecticide to control an insect attacking alfalfa. Also required is evidence that the insecticide residue does not contaminate milk when the alfalfa is fed to dairy animals.

Is there a difference in how much dust and sprays drift?

All dusts and sprays are made up of a wide range of particle size. The large particles drop out fast, and the small particles, slowly. The rate of fall of a small particle—and thus, its drift—depends more on its size than on its density or shape. A fine spray drifts just as far as a fine dust, perhaps farther if the solvent evaporates on the way down.

What Can Be Done

What, then, can be done to minimize the serious drift problem?

One obvious and well known hazard must be avoided—applications must not be made in a strong wind, or upwind from neighboring crops or homes.

Attention must also be given to chemical formulations. In the past few years considerable progress has been made in formulating both sprays and dusts of more uniform particle sizes, but much more work needs to be done. No simple rule can be given for the best particle size. Each pesticide is a problem in itself, in relation to the crop, the solvent, or the dust carrier.

How about possible residues due to the increasing use of large amounts of insecticides on land areas making up all or a part of a watershed?

Again, part of this problem hinges upon lack of precise control of the chemical during application. Information available on possible contamination of streams by pesticides applied to adjacent land areas shows that the danger is not serious, although it does exist.

The U.S. Public Health Service has initiated studies to determine pesticide residues in streams and public water supplies. In some cases, pesticides used for cotton insect control have been detected in water supplies. The amounts found were extremely low and of no significance whatever. But the effects of such data on the public makes it imperative that we study and eliminate even these minute quantities.

Some information is available to show that insecticides remaining in the soil are not normally carried by the water in the soil to water supplies. The insecticides are known to move from one place to another only by the mechanical movement of soil particles—such as through tilling or extensive surface erosion.

The buildup of residues of organic insecticides and their phytotoxic effects on subsequent crops has been under investigation in a number of areas for several years. In general, studies indicate there is a buildup of some chlorinate hydrocarbon insecticides. But there is little if any data to indicate a buildup of pesticide residues to the extent that they are phytotoxic to subsequent crops.

There have been reports, however, that residues of certain pesticides produce off-flavor in some crops. For example, the rotation of peanuts and cotton on which benzene hexachloride has been used. We need much more research to determine the effects of soil residues on root crops grown for food or forage, when such crops follow cotton in the farmer's crop rotation plan.

Many growers wishing to make maximum yields continue to apply insecticides during harvest to control the boll weevil.

In such cases, pesticide residues may be toxic to workers. It is absolutely essential that least hazardous materials be used. Furthermore, applications should be timed to allow the longest possible period of time before workers move into the fields.

Recent emphasis on post-season application of insecticides to kill diapausing boll weevils may present some residue problems. It is no longer practical for the cotton farmer to permit dairy or beef animals being finished for slaughter to feed on treated cotton fields. Every effort must be made to obtain data on residues present and their effects on livestock and wildlife.

In view of the growing use of desiccants and defoliants, a few words may be in order on those that have recently been registered for use on cotton. They will appear in the USDA Summary of Registered Agricultural Pesticide Chemical Uses, scheduled to be published early this month.

Sodium chlorate, arsenic acid, and pentachlorophenol were registered as pre-harvest desiccants, the latter two for use on seed crops only. Use of arsenic acid and pentachlorophenal on cotton for other than seed purposes originally was extended to March 5, 1961. Further extension will likely be authorized to complete research in progress.

Use of calcium cyanamid and tributylphosphorotrithioite on cotton was also extended to March 5 of this year. Further extension is likely to complete research now under way.

Magnesium chlorate and tributylphosphorothrithioate also are registered as pre-harvest defoliants.

All chemicals are registered for use with recommended application rates and with certain limitations. These include specific times of application, and warnings against livestock feeding in treated areas and against using seed or gin trash from treated cotton for food, feed, or oil purposes.

Use of aminotriazole, sodium arsenite, and 2,4-D on cotton has not been extended, nor have the labels been registered.

Chemicals Here to Stay

I believe chemicals are here to stay. Farmers have come to rely on them to protect crops and livestock from insects, diseases, and weeds, and to increase efficiency of farm operations in many other ways. They are an absolutely essential production tool with no present alternative.

But we must search for more efficient ways to use them. We must continue to look for new chemicals that have a wide margin of safety; for new control techniques that can be used alone or with chemicals. And, we must place greater emphasis on the use of chemicals in the weakest link of the life cycle of insects.

In following up every promising new lead, scientists are exploring many challenging areas. They are developing biological controls — including parasites, predators, and insect diseases — that can be substituted for chemicals in sensitive areas. They are looking into the use of insect sterility for eradication. They are studying attractants, baits, lures, and repellents that may be used independently or in combination with toxic materials.

Meanwhile, I would like to stress one important fact. No other country in the world has such comprehensive laws and enforcement procedures to insure the safe use of chemicals for food production and distribution. Many of the newer pesticides used in this country are commonly used in Europe, too.

The past decade has seen the most extensive body of research on all aspects of pesticides that exists anywhere in the world. Much of this stems from the highly dynamic and progressive nature of agriculture in this country, and the large and necessary role of pesticides. It is unlikely that any other country will ever approach the magniture of our research on this topic. Millions of dollars have been spent on study of pesticides, and many millions more will be spent in the future.

This concentration of research, time, money, and energy has only one objective—to provide a safe and adequate supply of food and fiber at reasonable cost.

Program Based on Facts

Every effort must be made to inform the public objectively on the provisions instituted to assure a safe and wholesome food supply. The program for pesticide safety is founded so firmly on logic and facts, and so tempered with extra precaution, that there should be no need even to defend it. It might be more realistic if critics of present-day pesticide use were challenged to accept full responsibility for our food supply, if pesticide usage were to be unrealistically curtailed.

Curtailment of pesticide use would result in reducing crops from 10 to 90 percent. Prices of most food items would increase greatly. Many items — mostly fruits and vegetables — would totally disappear from open markets.

USDA some years ago estimated that to offset the pest losses in agricultural production, an extra 88 million acres would have to be cultivated, and that losses subsequent to harvest equal the production of an additional 32 million acres. Estimates of the damage caused by agricultural pests rank between $8 and $15 billion annually—a quarter of our annual production—and this despite the widespread use of the best control practices now available.

Pests must be controlled or the food supply of the nation will decrease markedly in quantity and quality. These inescapable facts make it plain that chemicals are destined to continue as much a part of farming as the tractor.

Label Tells Story

The label is still the best available source of information on how to safely use a pest control production on a food crop. The Food and Drug Administration has frequently stated that it has never had to make a seizure of a food where it could be established that the pesticide was used in accordance with directions.

It would be encouraging to say the big changes in pesticide control are over, and we have only a few more things to learn.

But, unfortunately, such is not the case. We are still in a transitional period that may last some time. We may, during this period, find new and specific pesticidal chemicals. We may establish tolerances for all useful chemicals that leave residues on foods. And we may find that food production will become an even more precise science than it is today.

Two final points are so important they

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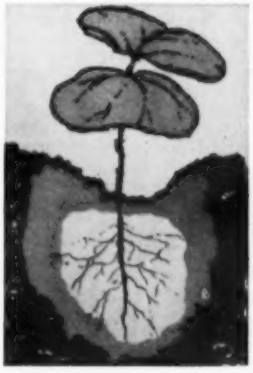

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cannot be overemphasized. First, the overwhelming fact that has clearly emerged from the many studies, hearings, and discussions of the past few years is that our foods are safer and more wholesome than ever before, and chemicals used on farms help make them so.

And second, the label tells the story. Before using a pesticide, read the label carefully and follow directions.

It becomes the responsibility of all concerned to work diligently to keep our food supply safe.

Applying Chemicals To Avoid Drift

■ **NORMAN B. AKESSON,** Agricultural Engineer, University of California, Davis.

■ **WESLEY E. YATES,** Associate Professor, Agricultural Engineering, University of California, Davis.

Determination of drift residue follows a four point analysis. (1) Determination of drift residue existing on the nearby crop shortly after application. (2) Determination of chemical and physical degradation (in case of dusts, for example, the material physically washes or falls off plant surfaces) of the given chemical on the given crop. (3) Effect on residue concentration by curing, drying and mixing of the food. (4) Determination of the feeding characteristics, the extent of deposits in fats and milk of the given chemical on a given feed crop with specified animals.

Part one is the primary concern of our study, but it should be evident that we cannot complete the information or even suggest measures for drift residue control without knowledge of parts two, three and four.

Test Series

Two test series were run during 1960 on specified chemicals drifting onto alfalfa for hay. Tests were conducted on June 23 and 24 and Oct. 3 and 4.

Objectives were to:

■ DETERMINE drift residue of specified chemicals on alfalfa hay at several points downwind from a treatment area of cotton.

■ DETERMINE correlation between actual chemical residue and tracers so that future runs might be made with tracers only.

■ OBTAIN limited chemical degradation data on specified chemicals on alfalfa grown for hay.

■ ESTABLISH knowledge of micro-weather patterns for the Bakersfield area, specificially during actual runs.

■ INDICATE the degree of drift residue resulting from fine versus medium spray atomization, (fine, under 150 microns arithmetic average and medium 150 to 300 microns) the comparison with dusts, and the effect of downwind distance on residue concentration.

The results obtained from the two-test series are limited. No residue data is available at this time on the October runs and no tests have been made with dusts. Although it is realized that dusts may give better control under certain conditions, evidence available would indicate a greatly increased drift hazard and thus it was thought best to concentrate our limited tests on sprays.

Runs were made with aircraft and spray apparatus set for medium and fine sprays in June and fine sprays in October. Application rate was aimed at 10 gallons per acre with 35-foot swaths taken to cover 40 acres for each test. A half-mile front was laid out in each case and the drift line was established in as near possible on the line of normal wind direction. Weather conditions as near normal as possible were chosen. This appeared to be in a four to six mph wind velocity range at 20-40 percent relative humidity and near normal adiabatic temperature lapse rate, which would indicate low turbulence conditions.

For the June runs the fine and medium sprays were applied simultaneously on separate fields. Nozzles on the fine set-up were S. S. Co., D8-46 hollow cone, aimed directly down, and the medium set-up was with one-eighth inch D-8 jets (no whirl plate) aimed down 45 degrees and back with the slipstream.

On June 23, Endrin and Aramite were applied by each plane in an emulsion formulation at 0.5 and 1.5 pounds active per 10 gallons of spray material (400 gallons total), respectively. A red dye at 0.2 pounds per 10 gallons and strontium chloride (not radioactive) at 0.5 pounds per 10 gallons were added for tracers. On June 24, 400 gallons of spray material was applied at a concentration of 4.5 pounds of Toxaphene plus 0.5 pounds of SrCl2 and 0.2 pounds of red dye (safranine) per 10 gallons of water. Again the spray was applied at approximately 10 gallons per acre.

Sampling set-up was as follows:

June Runs, Ground Samples

1. Alfalfa samples 10 pounds, three replicates at each station at zero days. Blanks taken day before treatment. Alfalfa 8-12 inches in height.

2. The SrCl2 samples were taken from six inch diameter filter paper (0.2 sq ft). Paper was ashed, dissolved in acid solution, and analyzed on a flame spectrophotometer.

3. Siliconed glass slides, 3.25 by 4 inches, one at each station for drop size information.

June Runs, Air Samples

1. Staplex air samplers collected air borne spray on four-inch diameter filter papers. These were analyzed for SrCl2.

2. One cassela cascade impactor on each drift used for air borne drop size. Micro-weather data was taken.

For the October runs, the same type plane was used (450 HP Stearman) with one-eighth inch jet nozzles aimed straight down. This appeared to give drop size of the fine range, under 150 microns arithmetic mean. The Oct. 3 run was with one-half gallon of Tedion and 0.1 pound of fluorescent tracer Fluoral 7CA, in 10 gallons total emulsion mix per acre.

The Oct. 4 run was with one gallon of DDT and 0.1 pound of 7GA, to give 10 gallons per acre. However, it was noted that this run may have been at considerable lower rate of application due to calibration problems.

October Runs, Ground Samples

1. Alfalfa samples, five replicates each station, five pounds each. Blanks (four replicates) were taken the previous day as before, but only one set of samples was taken to be analyzed for Tedion DDT and Endrin; the latter being applied the 4th after other runs completed. Post treatment samples (four replicates) were taken at 7, 14 and 21 days following treatment. None of this data on actual chemical residue is available at this time.

2. Siliconed glass slides (silicone is to make drops stand without spreading) one at each station.

3. Siliconed glass slides were also laid under the airplane for drop size data there.

October Runs, Air Samples

1. Staplex air samplers were used with replication.

2. Cascade impactors single units used.

3. Weather again taken as for the June runs.

Presentation of the Data

Drop distribution was somewhat larger than for Oct. 4 for the Oct. 3 run. These seem to refute other data which showed a larger drop size in the air on the run for Oct. 4 than for Oct. 3. It is suspected that there was a much lower spray discharge rate on the Oct. 4 run. But no immediate answer appears for the larger drop size in the air except that the weather appeared to be significantly more turbulent on the second day.

Other data also indicated a much lower discharge volume on the second day. It is possible that as much as two times more material was discharged on Oct 3.

Data taken June 23-24 indicated poor correlation of replicated samples of both the tracer and the active chemical from about 400 feet downwind. While little could be done for this on the hay samples, except to increase the number of replicates (to five on the October runs), it was thought than an increased sensitivity tracer was needed to obtain less variation in the tracer data and made it more accurate at least to the half mile station.

Fine spray gave more drift in each case, but the separation might indicate the increased wind and turbulence. The air samples indicate an almost 10-fold increase in drifting particles from the fine spray. The general pattern seems to fit that previously obtained by other observations. All data tracer was corrected to micrograms per 0.2 square feet.

Using fine and medium spray with active Toxaphene, fine and medium spray with the SrCl2 tracer and the 7GA tracer from the Oct. 3 run, an attempt was made to correlate the tracer and active chemical obtained. The relation was not too good, but if the data on the tracer is considered low at distances from 300 to 400 feet downwind, the matching would be improved. The 7GA run indicates this might be the case. Discounting different weather conditions, the 7GA run more nearly follows the fine drop active Toxaphene pattern. The 7GA and SrCl2 runs were corrected to each other. The active Toxaphene was applied with SrCl2 and hence is similar.

Drift curves may well follow the depressed section pattern, where such things as evaporation of spray to a constant particle size, weather conditions, and other factors do not permit a straight power function or simple Stokes law explanation of the fall-out.

Other data showed an increase in active chemical residue as dosage rate increased, but not in a linear manner. Since these were taken on different days, weather again played a role in disrupting the pattern. It is also likely that increasing the concentration in the spray

would not produce a direct relation in the increased deposit.

Detection Limits

The problem of residue tolerances and detection limits is still very clouded. The Federal law specified zero tolerance for Aramite, Heptachlor, Dieldrin and Aldrin on alfalfa, which the California law has adopted. DDT and Toxaphene are not specified under Federal law, but this means an automatic zero by Federal standard. However, when not specified, the California law says in effect no limit. California has, however, specified 0.5 ppm for DDT on dairy feeds including alfalfa.

Thus, any consideration for alfalfa hay having Aramite, Aldrin, Dieldrin, or Heptachlor must be based on the lower detection limits, which are subject to change at any time.

If we assume certain detection limits on which seizures might be based, we can discuss drift data as follows. Pesticide residues, all applied in fine spray form (one dust run), indicate that the amount of residue from Aramite applied at 1.5 pounds actual per acre is 0.25 ppm on the alfalfa at 500 feet. This esablishes point One, the pesticide residue. Now if the period to harvest from time of drift is taken as 30 days and the degradation data shows a half life of 4.5 days, then at 30 days the residue level would be 0.025 ppm (point Two).

Tests indicate that after curing the hay would have been twice the concentration of Aramite or $0.0025 \times 2 = .005$ (point Three).

This is likely below the detection limits of presently used analytical equipment and hence the point Four, the feeding characteristics, or the amount of Aramite in the milk would not need be considered because tentative information indicates that Aramite retention in milk is very low, hence the amount in the milk would be undetectable.

It is to be noted again that these data are in no way to be construed as tolerances, for there is no tolerance for any pesticide in milk. California, by permitting a 0.5 ppm tolerance of DDT on dairy feeds, takes into consideration a 1.50 feed-through of DDT or 0.01 ppm in milk. The practical detection limit of 0.1 of DDT in milk allows for a factor of safety in the California regulations of 10-fold, in the case of DDT.

Feeding Data

Feeding data are not available on all chemicals, but that presently indicates factors of 1.50 from DDT and several others, and as low as 1.100 for Toxaphene. In the case of Methoxachlor, none comes through in the milk.

Applying the four points to Toxaphene we find:

■ FINE SPRAY, 2.5 ppm at 500 feet, but note the drift test was with different weather conditions and also that Toxaphene is being applied at 4.5 pounds per acre.

■ INCOMPLETE degradation data shows about 4.5 days half life, hence in 30 days this would be $2.5/26.66 = 0.025$.

■ ASSUMING that curing the hay doubles the residue concentration, we would now have 0.05 ppm.

At this point we can only assume that this level 0.05 is not at seizure level of detection and that the hay could pass the Federal law. In California, no limit applies, hence the next step, point Four, the feed-through is applied.

■ FEED-THROUGH data indicates a 1:100 ratio, hence $0.05/100 = .0005$ ppm in milk. This is well below the limit of any detection equipment by a considerable factor of safety.

It must be pointed out that the data shown for residues and discussed above are based on very limited testing involving only one basic weather pattern with variations as noted. Though residue checks are being concentrated on milk, the Federal and California laws give the enforcement agencies the power to seize hay and there can be no guarantee that seizures won't be made at any time. Hence the lowest detection limits have to be considered on hay as noted.

When the feed-through (point Four) is considered, it generally adds a factor of safety of considerable magnitude, since for the chemicals discussed above, feed-through of 1.50, 1.100 and 1: infinity can be shown, depending on the chemical being fed. We are unable at this time to feel any degree of safety in recommending anything less than 500 feet downwind as the closest that applications should be made to alfalfa.

For an upwind case, 100 feet should suffice. While this may seem unduly conservative, particularly as regards milk contamination, it is the best that can be said as of now.

Further test data will be available from the October runs and it is expected that further runs will be made, particularly to determine the effect of other weather patterns. While we have advanced greatly in our technique regarding tracer use, the micro-weather correlation still remains a serious unknown and a stumbling block to any attempt to predict drift residues.

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Panel Discussion

1961 Insect Control Recommendations

Arizona:

DR. J. N. RONEY, Extension Entomologist, Phoenix.

One of the first things we must consider in controlling cotton insects in Arizona in 1961 is the safety and drift factor. Farmers should read the label and use only those insecticides that will not cause trouble. Printed on yellow paper, the following warning will be sent to all cotton growers:

KEEP ARIZONA'S FOOD AND FEED CROPS FREE OF CONTAMINATION!

- **Read The Label On All Agricultural Chemical Containers.**
- **Follow Directions Carefully.**
- **Use Only As Specified.**
- **Observe Proper Safety Precautions.**

REMEMBER: ALL CHEMICALS ARE DANGEROUS IF HANDLED IMPROPERLY!

Cooperative Extension Service, The University of Arizona

When dusting or spraying cotton next to alfalfa, small grains or grain sorghums, users must be sure that none of the chlorinated hydrocarbons drift onto the above crops. If they do drift, cut and bail the hay and feed only to livestock not to be sold in the near future. Never feed to dairy animals. You may use Dibrom on cotton next to alfalfa without any harm for feeding purposes. Bulletin A-2 of the University of Arizona gives the exact amount to use.

We recommend control of thrips in the higher elevations with a granular phorate at time of planting, or treating later with toxaphene, malathion or dieldrin. Thrips must be controlled on the seedling plants in the higher elevations of Arizona.

The past few years, farmers have had reduced cotton yields because of failure to control lygus. Check fields closely. When five to six lygus per 100 sweeps are present at five points in the field, start controls with at least two applications at seven to ten day intervals. In some instances four applications may be needed. This includes not only Lygus but also the black fleahopper and the common fleahopper.

In 1960, a grower in Arizona grew cotton on good land. With 286 pounds of insecticide per acre at a cost of $57.24 per acre, he picked 1,920 pounds lint. You can produce two bales of cotton in Arizona with very little insect control, but this shows that you can do far better if insects are controlled on cotton grown on good land.

California:

ANDREW S. DEAL, Extension Entomologist, Riverside, Calif.

Maximum yields of high quality cotton depend largely upon good farming practices. This means use of the best available methods of land preparation, planting, fertilization, irrigation, weed control, defoliation and harvesting.

Producing a bale of cotton in our area costs the grower approximately $150. For many, one-fourth to one-third or more of this goes into pest control. This is a tremendous toll to take from the grower's profits. We believe this can be reduced by employing more efficient pest control methods. This is our goal.

One definition of "efficient" as given by Webster is "having and using the requisite knowledge, skill and industry." Efficiency in pest control is all of this, including the utilization of every tool available which will help to prevent pest damage and reduce the cost of production.

■ FIELD CLEANUP as soon as possible following harvest is recommended as a means of reducing overwintering populations of many cotton pests such as mites, cotton bollworm, cotton leaf perforator, cutworms, stink bugs, lygus bugs and others. Old cotton stalks should be plowed under and weeds in fields, on ditchbanks and along fence rows should be destroyed.

The growing of stub cotton is discouraged, even though excellent yields have been produced by this method in California. Stub cotton fields provide a place for pests to live during the winter. These pest populations may give rise to earlier than normal insect and mite infestations not only in the stub cotton, but also in nearby spring planted cotton. This is especially true of the cotton leaf perforator and spider mites. The growing of stub cotton is a particular hazard since the pink bollworm is present only a short distance away.

■ CAREFUL AND REGULAR evaluation of insect and mite populations in cotton fields is recommended as a means of preventing unexpected outbreaks of pests. Making a record of population counts of both pest and beneficial species during each field inspection is suggested. Upward or downward trends can then be noted and predictions made as to the need for future control measures.

■ PROTECTION AND UTILIZATION of beneficial species is one of the most important means of reducing production costs and preventing crop losses due to insect and mite pests. Parasites and predators, along with other factors, will often hold pest populations below damaging levels in cotton fields in California which have produced average yields of three or more bales of high quality lint per acre with no more than three insecticide treatments per season. Some of these fields have received no more than one or two treatments, and a few have received none at all! I do not wish to leave the impression that pests in all fields can be controlled with so few treatments, but I do wish to emphasize that many fields receive more chemicals than are necessary.

■ PREVENTIVE OR "INSURANCE" type treatments, or treatments on a regular schedule, are to be avoided. They are highly damaging to beneficial species, and only increase costs unnecessarily. In addition, such treatments often initiate the buildup of pest populations which would not ordinarily occur. Increased crop damage and even greater expenditures for purchase of chemicals may result. One grower in the Imperial Valley of California treated a rather large acreage at weekly intervals last season for a total of approximately 16 treatments. His insecticide bill was nearly $72 per acre. This deluge of chemicals resulted in one of the most severe spider mite problems that has ever occurred in that valley. Cotton yields were no better than from fields not treated in a schedule.

■ INTEGRATED CONTROL is the use of both biological and chemical control in the same field or area. It works like this: Beneficial species are allowed to keep pest populations under control when possible. When conditions become unfavorable for parasites and predators, and pests threaten damage, a chemical is applied. This chemical is a selective type insecticide which brings the pest population below the damaging level, while causing little harm to beneficial species. With the pest species greatly reduced in numbers, parasites and predators may again have the advantage and be able to maintain control.

Such an integrated control program has worked successfully for many alfalfa growers in our area. Native predators, fungi, and imported parasites normally keep the spotted alfalfa aphid under control for most of the year. Occasionally during hot summer months when conditions are favorable for aphids and unfavorable for the beneficial species, the aphid reaches damaging levels. Growers then apply systox, a selective insecticide which reduces the aphid populations to a low level, but does little harm to beneficial insects. Such fields may not require further chemical treatments for several weeks, if at all, for the rest of the season.

We believe integrated control will work on cotton, too, and our research entomologists are doing a great deal of work toward that end. We still have a long way to go, but our 1961 cotton insect control recommendations in California include at least two selective insecticides which are less toxic to most of the beneficial species than many other chemicals used. These are dylox and sevin. Dylox is recommended for control of the beet armyworm, lygus bugs, leafhoppers, cotton leaf perforator, saltmarsh caterpillar, leafrollers and stink bugs. Sevin is recommended for control of the cotton leaf perforator, saltmarsh caterpillar, cotton bollworm, and leafrollers.

■ SUPERVISED CONTROL is a term we use for method whereby a grower or a group of growers employ a trained and experienced entomologist to follow insect and mite populations and make recommendations concerning the control of these pests. Unnecessary treatments are avoided and chemical control measures are made more effective through better timing. Beneficial insect populations are evaluated, and full advantage is taken of those present. Control measures are tailored for the particular conditions found in each field. When employing supervised control, the grower can feel assured he is following the best pest control program possible.

One of our important problems today is pesticide residues which occur on alfalfa, vegetables, and other feed and food crops as a result of drift during applications to cotton fields. Much effort is being made to avoid drift. One step being taken is to substitute sprays for dusts where practical. This procedure will be followed in our 1961 cotton insect control recommendations by eliminating

the use of dusts where possible, particularly for control of such seedling pests as cutworms, beet armyworms and others.

These are the principles behind our 1961 cotton insect control recommendations in California. We feel that by following such principles, the grower may obtain the most effective, safe and economical control possible at this time. We in research and extension shall continue to work for even better methods in the future.

New Mexico:

■ **JOHN J. DURKIN, Extension Entomologist, University Park, New Mexico.**

Chemicals that make cotton seedlings bite back at thrips, aphids and red spiders are being recommended on a trial basis for 1961. Di-Syston and phorate, two systemic insecticides which have been around for about four years, gave outstanding results in 1960 experiments. Granular formulations applied in the seed furrow at planting seems to be the answer to the problems we've had with these two chemicals in the past.

When phorate and Di-Syston were introduced, they were used as seed treatments. Treated seeds produced seedlings that would bite back at thrips, aphids and red spiders, but under certain conditions treated seeds failed to germinate. Therefore, seed treatment with Di-Syston and phorate was never recommended in New Mexico.

Now that granular formulations are available, we think we can get around this loss-of-stand problem and benefit from thrips control.

In experiments, treated plots yielded over one-third of a bale per acre more than untreated plots. A $4 per acre investment at planting returned $59 per acre at harvest.

Even after such outstanding results, we feel a lot of work must be done before we can recommend granular applications of systemic insecticides as a general practice. The experiment should be repeated for at least three more years to make sure 1960 wasn't one year in five or 10 that such outstanding results could be obtained. We would like to try the same test on a variety of soils. There is always the possibility that reduced germination may plague us again.

The 1960 season was the worst thrips season most cotton producers in New Mexico had ever experienced. In untreated plots, thrips populations were as high as 26 larvae per plant on April 27, nine days after the seedlings emerged. Populations remained high until May 11.

Recommendation of Di-Syston and phorate on a trial basis is the only outstanding change in recommendations. Methyl parathion in combination with chlorinated hydrocarbons is being more strongly recommended in 1961 because of its performance in 1960 in giving rapid knockdown of heavy thrips populations and large cabbage loopers. If thrips, cabbage loopers or lygus bugs build up heavy populations as a result of delayed control, it is advisable to combine methyl parathion with slower acting insecticides.

Sevin Recommended

We strongly recommend Sevin for early-season thrips control and for mid- and late-season bollworm and lygus bug control. Not only is Sevin proving to be very effective for control of our major cotton pests, but it also looks like it may be part of the answer to our drift problem. Although Sevin isn't labeled for direct use on alfalfa, research has shown it will not produce residues in milk of dairy animals. It is approved for use on corn, which is regularly fed to dairy animals. Sevin, rather than DDT or endrin, should be used for bollworn control if there is any possibility of drift onto neighboring alfalfa or other forage crops that might be fed to dairy animals.

Cotton insect control recommendations must be adjusted to neighboring crops. For years we have restricted the use of sulfur where melons were being grown near cotton. We have also restricted the use of BHC for cotton insect control where vegetables are being grown because of the threat of off-flavors as a result of BHC drift. The restrictions have been self-imposed by applicators and farmers out of respect for their neighbors.

Now that dairymen face a residue problem in milk as a result of feed and forage that contains DDT and related compounds, cotton producers and aerial applicators should observe self-imposed restrictions on the use of pesticides where there is any possibility that drift may contaminate feed or forage crops.

In New Mexico we are encouraging cotton producers, pesticide dealers and applicators to think of the dairymen and feed producers before applying pesticides. If certain restrictions on the use of insecticides that may cause a residue problem in milk aren't observed, I fear the dairy industry may insist that stringent laws be enacted and enforced. If laws are enacted, the taxpayers, who

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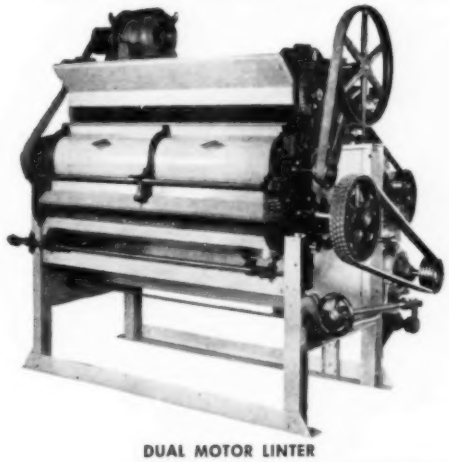

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have to pay for the enforcement of such laws, will have another burden to bear. I hope agriculture and the pesticide industry can work out this problem among themselves without having to set up policing agencies.

Insect control recommendations for 1961 are set up to control our cotton pests as well as to protect our milk producers from a possible residue problem.

Value of Crop Rotation

■ **DR. D. F. McALISTER**, Head, Department of Agronomy, University of Arizona, Tucson.

Faced with being permitted to grow cotton on a limited part of his land, a cotton grower is tempted to plant this crop on his best land, even though it is the same land, year after year. To set this temptation aside has been demonstrated more times than is good for the soil on a number of Arizona farms. In such instances the grower hopes productivity will be maintained by replacing the minerals removed each year by the cotton crop. This is not a good practice.

Crop Rotation Benefits

■ PRODUCTIVITY and physical condition of the soil—Cultivated soils in our warm climate and under irrigation are subject to more stress from tillage operations and irrigation than the farm soils of the Northern states.

Each operation has a tendency to destroy soil structure. A soil in good tilth can withstand these attempts to pull it apart. Crop rotations will help keep the soil particles tied together to provide the porous, productive medium needed by plant roots. Continuous planting frequently results in a breakdown of the soil granules into the individual particles of clay, silt or sand. Such a soil is never as productive as when it was claimed from the desert.

A cotton farmer whose soil is porous because of its good physical condition has no trouble in getting water penetration in the preplant irrigation or in those made while the crop is growing. Water penetrates into a soil with a poor structure very slowly. A crop such as alfalfa not only helps keep the surface soil in good physical condition, but the deeply penetrating roots provide channels for deep movement of water, as the roots decay after the crop is plowed under. A soil with good structure also retains more water after irrigation than one which is in poor tilth.

Movement of oxygen and other gases in and out of the soil is retarded unless the soil is porous. Air movement and water movement depend upon similar physical factors in the soil and so when the structure of the soil is good for one, it is generally good for the other.

Root growth through the soil is also dependent upon physical condition. Roots must push their way through the soil physically and if they meet with too much resistance in a structureless, compacted soil, they simply stop growing and so does the top part of the plant.

The ideal productive soil is one through which water and gases can move easily, has good water holding capacity, permits full development of the root system, which contains the necessary amounts of the essential minerals in a readily available form and which contains no disease organisms. Some of our desert soils were in just this condition when they were first brought under cultivation and many of our farm soils which have been under cultivation for years are still in this condition as a result of good management and the proper use of fertilizers. Our soils vary in both native fertility, texture and structure so that each presents a different management problem.

The presence of organic matter is a basic requirement if a soil is to have good structure.

Our best farm soils contain only from 0.1 to 1.0 percent of organic matter, a small fraction of that found in the prairie soils of the Midwest. Furthermore, because of our warm climate, irrigation and frequent tillage operations, organic matter decomposes much more quickly than in cooler regions. This is why we must wage a continual battle to maintain or build organic matter in our farm soils.

A cotton grower should be just as interested in seeing that all possible residue of leaves and stalks of all his crops are plowed under as in applying the right amount of fertilizer or water. Crops should be planned for each field so that one producing a large amount of organic matter is turned under frequently or else plan a rotation including alfalfa which builds organic matter slowly while the land is not being cultivated. Under some conditions, turning under the residue from a good cotton crop will maintain the organic matter at a satisfactory level. Even under these conditions, however,

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continuous cropping to cotton is not wise.

There is an increasing tendency towards minimum tillage in the Southwest. Minimum tillage consistent with good seedbed preparation, irrigation, and weed control makes sense, both from the standpoint of production costs and maintaining a productive soil. Rotating deep and shallow rooted crops or solid planted versus row crops naturally encourages good tillage practices.

■ REDUCTION in nitrogen fertilizer requirements for the cash crop—If nitrogen is applied in the usual manner on the cotton crop following alfalfa, there is a possibility of an oversupply of nitrogen which may result in excessive vegetative growth and lodging. When cotton is grown for three years following alfalfa, some nitrogen is generally needed the second year and in the neighborhood of 100 pounds of nitrogen per acre the third year. The usual net effect of a sound rotation is to reduce the amount of nitrogen fertilizer needed and increase the effectiveness of those units of nitrogen applied.

■ BETTER DISTRIBUTION of water supply—Cropping systems must be planned so that the peak demands for water of two crops do not come at the same time. Cotton, alfalfa and small grains fit well in a rotation from the standpoint of peak water-use periods. Where the water supply is limited and when sorghum is one of the crops grown, special attention should be given to time of planting and variety used so that its heavy period of water used at flowering does not come during July and August.

■ AIDS IN PEST CONTROL—When cotton is grown year after year on the same land, diseases build up in the soil. This is particularly true regarding Verticillium wilt. Once this disease has become established in a soil it is difficult, if not impossible to eradicate. If a cotton grower does not have Verticillium wilt, crop rotation is good insurance against a buildup of the disease. If he already has an infestation, rotation is one means of fighting it and still producing.

Cotton root rot is another disease which, althought not eradicated, can be lived with and good yields obtained by crop rotation. A winter green manure crop, such as Papago peas turned under before cotton is planted, will result in good cotton yields in root rot infested land.

Seedling diseases are also generally less abundant on farms where a systematic crop rotation is followed. Experience in Arizona has shown cotton seedling diseases may occasionally be severe when cotton is planted immediately following alfalfa. In this situation, it is best to put a grain crop between alfalfa and cotton crops.

Any insect that overwinters on crop residue may be a serious problem if the same crop is planted on land where that insect is present the previous year. The watchword here is to turn under all crop residue and use a sound cropping system.

Crop rotation is one of the basic requirements in any weed control program. Summer grasses and annual morning glory are expensive in any cotton field. They either lower lint quality or make harvesting difficult, or both. Such weeds do not build up to serious proportions in fields where a systematic cropping sequence is followed.

New herbicides for control of weeds after layby are offering renewed hope for the elimination of hand labor. To reach the goal of maximum effectiveness, however, these herbicides must be accompanied by good cropping practices. Keeping the weed seed content of our soils down to manageable levels is a prime function of crop rotation.

Planning a Rotation

The cotton acreage allotment for a particular farm is, of course, a prime factor in deciding the best crop sequence to use. If the allotment is low compared with the acres cropped, the choice of land is flexible. The cotton allotment should, of course, be planted on the best land available each year, but not the same field. If the allotment has been more generous, careful planning is necessary to place the cotton crop in the proper sequence to assure continued high yields.

Another basic point to consider is the water supply and its cost. The supply must be distributed so that no crop in the rotation is going to be stressed for water at a critical point in its development.

Irrigation water cost frequently determines whether a soil improving crop such as alfalfa can be grown in the rotation. If the cost of the water exceeds the cash value of the crop and its estimated value to the cotton crop, then alfalfa is hard to justify.

If a soil is critically low in organic matter, the expense of growing green manure crops may be justified. If the objective is to maintain present productiveness, then a cropping system designed to meet the ordinary requirements for organic matter turnover would be suffi-

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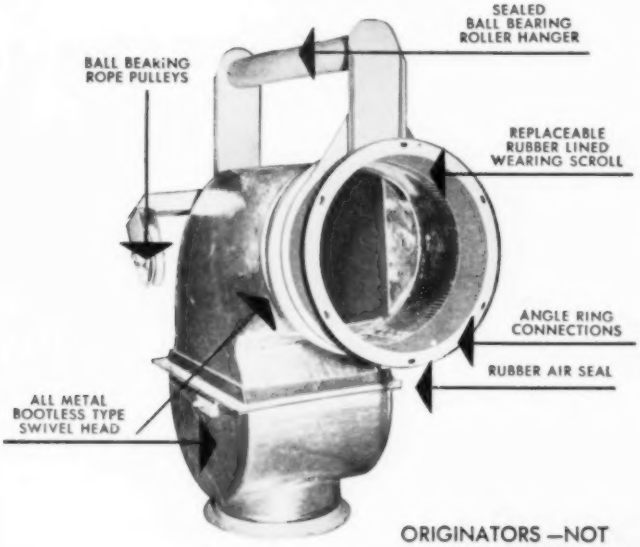
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cient. Presence or absence of diseases, insects, and weeds also will influence the type of rotation used.

Rotations for Arizona

Let us consider some of the systems in use:

Alfalfa is grown for three years, cotton for two years and the sixth, barley and sorghum may be double cropped or as one or the other grown alone. Such a cropping sequence would provide for most of the benefits of rotation. It is flexible enough to allow for vegetable production in one of the seasons when the land is not in alfalfa.

A cropping sequence of cotton and barley or cotton and sorghum in alternate years is a fairly common rotation in Arizona. There is some evidence which suggests such a rotation helps keep Verticillium wilt in check. If the residue from the grain crops is all plowed under, this system will usually maintain organic matter. When the land is plowed and clean fallowed after barley, Johnsongrass can be kept under control with this rotation.

Skip-row planting of cotton forms the basis for another rotation common in Arizona. The four rows skipped one year are planted to cotton the next year. This system has some advantage where there is enough of a yield increase in the outside rows to more than make up for the increased cost of cotton production. There are also cotton growers who alternately plant a field to cotton one year and dry fallow it the next. Lint yields on land infested with Verticillium wilt have held up better under this management than where cotton followed cotton.

Although growing green manure crops between cotton crops will build up the organic matter content of the soil rapidly, there is little justification for this rotation unless a soil is dangerously low in organic matter, or where there is a need to control a disease such as cotton root rot.

We do not know enough about rotations to make really sound specific recommendations for the Southwest. The results of good crop rotation studies done during the 1930s and 1940s do not apply now. Cotton production methods have changed almost completely during the last 15 years. We need some well-planned crop rotation research based on the latest information available on fertilizers, crop varieties and pest control, as well as a deeper look into the economic factors.

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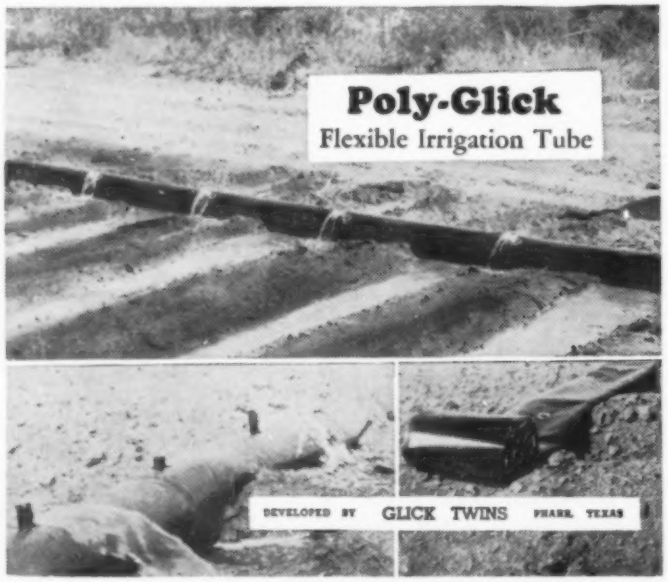

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Water Needs for Efficiency

■ LEONARD J. ERIE, Irrigation Engineer, ARS-USDA, Southwest Water Conservation Laboratory, Tempe, Ariz.

Studies on irrigation of cotton have been conducted in Arizona for many years. Yield per acre has continued to increase, reaching an all-time high in 1954 and following a fairly constant trend to date. Improved varieties, insect and weed control, modern fertilizer practices, and perhaps better water management and tillage practices have been largely responsible. Most producers can prophesy that a better yield would probably have been obtained if the irrigation water had been managed differently. Recent studies show that some years' cotton may require less than six irrigations to produce maximum yields. We also have evidence that if the last irrigation is given too late, or a severe stress is allowed in late August or early September and then an irrigation, yields may be reduced. Irrigating too frequently under certain conditions can result in reduced yields. Too much vegetative growth and not enough fruiting are usually associated with yield reductions.

"65 Percent Concept"

A "65 percent concept" has been introduced because of recent research studies. This concept merely infers than an irrigation should be given when 65 percent of the available water has been used from an average of the top three feet of soil. This criteria for irrigating coincides with certain visual leaf color changes and blossom profusion, which quite consistently amounts to six irrigations on clay-loam soils in central Arizona.

A study was initiated in 1958 at the Cotton Research Center in cooperation with the University of Arizona. It consisted of five irrigation treatments, based on the calendar, on long and short staple cotton. A blossom-tagging study was conducted on each irrigation treatment. Soil moisture depletion was measured, tags were placed on approximately 70,000 blossoms and lint quality measurements made. This study was again conducted in 1959 and 1960 with several modifications. The main change in 1960 was that irrigation treatments were changed from a calendar schedule arrangement to one requiring that irrigations be given on

the basis of soil moisture depletions in the top three feet, ranging from 50 to 85 percent moisture used.

Obtaining information on when, how, and why, cotton plants blossom and produce bolls is very complicated. A cotton blossom is initiated about 20 days before it opens. Nearly 10 more days must elapse before the boll has a good chance of making cotton. During this 30 days, innumerable factors such as temperature, fertilization, water, rainfall, insects, humidity and wind may exert an effect on the blossom and boll set, thus limiting the conclusions that can be made on blossom and boll set from this experiment.

This study has not satisfied all of our desires for knowledge; however, certain points seem conclusive and others show trends. A few act as guides to further study and adjustment of this experiment. This study is conducted on McCellan clay-loam having about one and three-fourths inches of available water per foot. Cotton usually has a growing season of nearly 180 days and a 100-day flowering period. Acala 44 and Pima S-1 cotton were used.

Summary

Each irrigation must be adequate or any pre-timed schedule will fail whether on a scientific or calendar basis. Adequate irrigation means penetration into the root zone to replenish the used water.

Unevaluated growing characteristics cause plants to perform differently from year to year. Consumptive use varies, so moisture needs vary. There is evidence that the 65 percent concept is a reasonable approach to scientific scheduling of irrigations. Unfortunately, we do not have equipment that can quickly and easily tell when 65 percent of the available water has been used. We have an excellent indicator in the plant leaves if we have courage to believe them.

Mistakes Critical in August

There is evidence that mismanagement of irrigation water in August is more critical than in June and July. Blossom and boll peaks can be moved and their size altered by management of irrigation water. Bolls are reduced in size by severely stressing plants for moisture.

Again, I would like to emphasize the importance of an adequate irrigation. As a result of observing, measuring, consulting and investigating poor production fields, one item seems closely related to poor production, and now is the time to plan to combat it; that is, poor infiltration of water upsetting the 65 per cent concept or any other desirable irrigation schedule.

Infiltration rates are closely related to tillage practices. Severe tillage practices reduce infiltration rates—reduced infiltration rates introduce water-management hazards that are many times impossible and not feasibly practical to cope with. Plant-moisture needs are not satisfied; fertility-plant relations are disturbed. The net result is poor yield.

How can you plan now?

Soil is presently in a plowed condition. It should be allowed to remain as near that condition as possible, but still obtain germination and control irrigation water. Do no manipulate soil or allow tire traffic unless absolutely necessary. Be brave when watching for the plants to tell you when to irrigate. If these simple, cost-reducing rules are followed, I believe high yields will be obtained at a minimum expense.

Balancing Irrigation And Fertilization

■ **MARVIN HOOVER, Extension Cotton Specialist, U.S. Cotton Field Station, Shafter, Calif.**

Cotton is not necessarily hard on soils from the point of view of depleting it severely of nutrients. Nutrient requirements of cotton are less than for corn or tobacco and considerably less than for peanuts and alfalfa. When only seed and lint are removed from a field, at least 75 percent of the total dry matter produced is returned to the soil.

A one-bale yield removes about 35 pounds of nitrogen, 14 pounds of phosphoric acid and 14 pounds of potash. To produce this one-bale yield, however, requires about 94 pounds of nitrogen, 43 pounds of phosphoric acid and 84 pounds of potash.

Cotton moisture requirement is fairly high. Use of water by the plant varies markedly with climate and the amount and frequency of additions of water to the soil. The daily rate requirement changes throughout the season because of increases in plant tissue and changes in environment. Most of you, I am sure, have noted the effects of both drought

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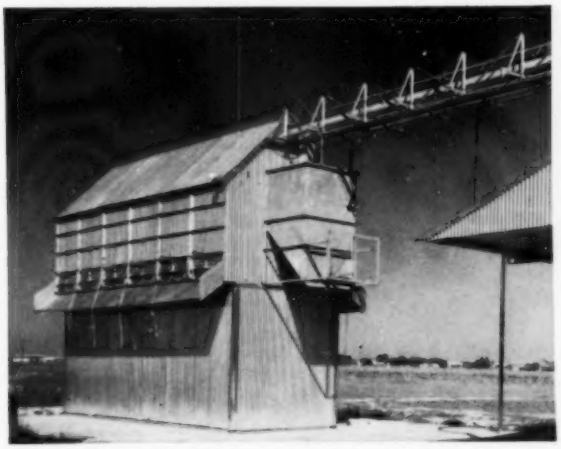

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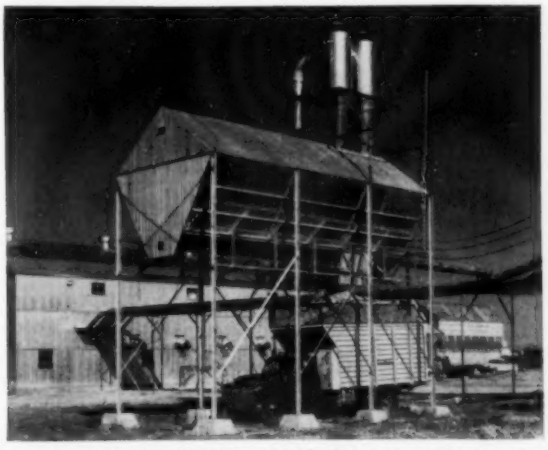

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and excess moisture conditions upon the cotton plant growth and maturity.

Placement, Timing Vital

Proper placement of nitrogen is important. To minimize leaching of nitrogen on coarse-textured soils, placement as a sidedress application should be closer to the plant row. On fine-textured soils placement can be further away and still be efficientiy used by the plant.

Time of application of nitrogen can be very important on some soil types. Most fields being planted to cotton have adequate nitrogen to supply the needs of young cotton plants. However, in many instances, it is advisable to apply a portion of the total nitrogen prior to planting. Up to flowering, less than 20 percent of the total nitrogen adsorbed has been used.

Because leaching is not a great problem on fine-textured clay soils, nitrogen can be applied prior to planting and even prior to pre-irrigation in many instances if there is ample soil moisture to retain the nitrogen. It may be desirable however, even on heavy soils, to make the application as a sidedress after cotton is up.

On coarse-textured soils it is advisable to withhold nitrogen until at least time of planting or as a sidedress after cotton is up. Leaching is such a problem on coarse-textured soils that early applications may result in movement below the root system of the plant. Nitrogen will therefore be inefficiently used.

On sandy soils it is sometimes advisable to make split-applications because of leaching. For most soils, however, the nitrogen should be applied by the time of the first blooms. The danger with split-application is that plants may lodge and be immature at the end of the season.

Nitrogen deficiency symptoms are easily recognized. Light green color and reduced plant growth are typical. During the flowering period the blossoms are very prominent. This is in contrast to the dark green color, more extensive growth and lack of flowering. Excessive rates of nitrogen can result in excessive vegetative growth, lodging and general delay in maturity. A much more moderate rate of nitrogen can result in better maturity, higher quality, less boll rot and better harvesting conditions.

Tissue Analysis Revealing

Plant tissue analysis work in California has given a better insight on nitrogen needs of cotton. The leaf stem of the third leaf from the terminal of the plant is used for analysis. Usually the third or fourth leaf from the terminal is the youngest leaf or near full size—and has found to be quite satisfactory in this work.

Studies on the general relationship of nitrate content to maximum yields at various dates of samplings showed on July 1 the levels should be from 10,000 to 15,000 parts per million or greater. Plants on some soils may start out at a higher level, but should drop rapidly. Otherwise, the nitrate level may remain too high later in the season. Plants on other soils may start at the lower level, but are able to maintain available nitrogen to fulfill plant requirements throughout the season. On July 15 the levels should be 5,000 and 8,000 or slightly greater, and on Aug. 1 between 2,000 and 4,000 parts per million. On Aug. 15 the level should be from 1,000 to 2,000 parts per million and should be maintained in the neighborhood of 1,000 parts per million for the remainder of the season.

These levels have been adequate for optimum growth and production. Higher levels often result in rank growth, with increased number of boll rots and late maturity. Marked deficiencies of nitrogen have resulted in stunted growth and low yields. Any interruption in the normal initiation of flowering and boll set will be reflected in higher levels at later sampling dates.

In California we have not found use of tissue analysis of any real value to the grower in trying to adjust his fertilizer program during the current growing season. It does, however, afford him an opportunity to see whether nitrogen applications are being efficiently used by plants and whether present rate of application is sufficient to give maximum yields.

Irrigation Findings

Research has shown it is important that young seedlings have adequate moisture for vigorous growth to time of flowering. However, there has been some conflict and confusion in the minds of growers on the importance of timing of the first irrigation. Irrigation studies have shown that when the first irrigation has been delayed and plant growth suppressed, it may have a marked effect upon the final growth pattern of the crop.

Effects of the starting date of irrigation become confounded when plant population and the soil type on which the crop is grown are considered. Undoubtedly, nitrogen is also involved particularly when coarse-textured sandy soils are involved.

Instructions which provide a reading of moisture tension or electrical resistance in determining when to irrigate can be an aid if an adequate number are properly placed at varying depths and locations in a field. They may need to be selected according to soil type, and should be serviced and read frequently and the readings interpreted. Instruments can be of real value in checking to see whether irrigations are satisfactory as to distribution and depth of penetration. They also can serve as an indicator of the change in soil moisture and may be of some value in predicting irrigation needs after considerable experience. But irrigating according to instruments alone could result in disappointments. Plants are still the best guide in determining when to apply an irrigation. Instruments can aid in telling whether a good job is being done.

After plants begin flowering the position of the blooms indicate how rapidly the plant is growing. Squares at the top of the plant should be rather prominent. A few flowers should be readily observed among the upper leaves just prior to an irrigation.

When only leaves are noticable, rapid growth is being made and an irrigation is not yet needed. Ordinarily, there should be three or four inches of tender, green stem between the terminal bud and the reddish coloring of the stock. An extension of this reddish coloring toward the terminal bud indicates the checking of growth and need of irrigation. A flower garden effect indicates restricted growth and a need of irrigation already too long delayed.

Sudden wilting of plants should not be allowed to occur generally throughout the field. Wilting causes greater shedding of young bolls and intense shedding of small squares. Sudden wilting of plants with this type of vigorous growth generally indicates either limited root system or a very coarse-textured soil with low water holding capacity.

Any stress which occurs during midbloom also will result in vigorous, renewed vegetative growth and extreme lodging if frequent irrigations are resumed.

Timing of the last irrigation is something all areas where cotton is grown under irrigation have to decide for themselves.

In the San Joaquin Valley, where cotton normally needs to be irrigated once every week, the last irrigation probably should be around the first of September or later. Where irrigation frequency has been about two weeks, the cut-off date should be about Aug. 30. Where it has been 21 days to a month between irrigations, the cut-off date can be around Aug. 10 with satisfactory results.

Nitrogen and soil moisture play an important role in defoliation. Under some conditions defoliation is not suggested nor needed if natural leaf fall is obtained by timing the date of last irrigation correctly. Where either the nitrate level in the plant at time of treating is high or continuing irrigations too late in the season or both can drastically affect the degree of success in getting leaves to drop.

The interaction of all production factors are continually changing the environment in which the plant is growing and all must receive attention in making decisions as to operations which should be followed and when it should be done.

"Crazy Top" – Causes And Treatment

■ **DR. RALPH A. SCOTT, JR.,** Plant Physiologist, ARS-USDA, Cotton Research Center, Tempe, Ariz.

A naturally occuring nondehiscent anther disorder in cotton, crazy-top, was recognized in 1919 in the Salt River Valley of Arizona. Economic losses are manifested in the abscission of reproductive tissue when flowers are not pollinated.

The crazy-top plant sets fruit until July 1, when nondehiscent anthers (anthers that do not release pollen) are detected. The nondehiscent-anther occurrence is accompanied by a general reduction in floral-tissue size. From July 15 until late season, a gradual transformation from reproductive to vegetative apical branches occurs. The apical branches on crazy-top plants characteristically have shortened internodes and varying degrees of abnormal leaf size, shape, and arrangement.

Preliminary studies were made in 1959 on the assumption that an altered metabolism produces a toxic-shunt compound. The toxic-shunt compound was further suggested by localized brown areas on anthers of crazy-top plants. Data from these studies indicate several nitrogen-containing biochemicals induced partial to complete correction of the crazy-top disorder. Foliar applications of choline chloride or urea at rates of 100 and 500 micrograms per plant produced the best correction.

The present studies were undertaken to extend and verify the correction of crazy-top with single and multiple appli-

cations of urea or choline chloride throughout the growing season.

Materials and Methods

Two fields with past crazy-top histories planted with Acala-44 and one field planted with Deltapine short-staple cotton were selected in April, 1960, at Maricopa, Ariz. Sixty 100-feet-long plots in each field were labeled for future applications. Single and multiple chemical applications were carried out at two-week intervals from June 1 through Aug. 15.

Urea and choline chloride were applied at one-half and one pound per acre. Chemicals were hand-sprayed at 40 pounds per square inch. Two check plots were not chemically treated.

On dates chemicals were applied, floral and boll data were also obtained. The number of dehiscent and nondehiscent flowers and the average number of bolls per plant in each plot were recorded. All plots were hand-picked to obtain seed-cotton yields.

Early Applications Best

Urea or choline chloride was effective in bringing about the release of pollen from the anther again in the 1960 cotton season. The conversion of nondehiscent anthers to anthers that release pollen occurs within two weeks after either chemical is applied.

The value of early applications in June and July was evident. The increase in boll counts with multiple applications or an early single application compared with boll counts made from plots treated late in season clearly indicate the value of correcting nondehiscent-anther disorder early.

The economic significance of an early application is indicated by the fact that five applications throughout the season produced 3,868 pounds of seed cotton per acre, and two applications in August produced 1,856 pounds per acre when one-half pound of choline chloride per acre was used on the Acala-44. An early application, therefore, resulted in a 52 percent increase over late-season applications.

A similar example for a single treatment on June 15 is a yield of 3,894 pounds of seed cotton per acre compared with 2,012 pounds per acre in a single application. Early application on Acala-44 cotton, therefore, increased the yield 48 percent.

The percentage increases in seed-cotton yield above check plots when one-half pound per acre of choline is used are 89 percent for the early five-multiple applications, 75 percent for the late two-multiple applications, 84 percent for the single application June 15, and 73 percent for the late single applications on Aug. 15.

Effective Two Months

Data indicates that urea or choline chloride is equally effective when multiple applications are used in correcting the crazy-top anther so that pollen is released and normal reproductive processes are completed. Indications are that choline chloride is more effective than urea in correcting crazy-top when a single application is used. In every plot, urea or choline chloride produced an increase in dehiscent flowers, number of bolls, and yield. Both chemicals are effective for approximately two months. After two months, the crazy-top plant reverts back to the nondehiscent-anther condition.

Urea and choline chloride were applied commercially to 11,000 acres that the author has observed. The commercial application rates by airplane were one-fourth and one pound per acre, respectively, for the choline chloride and urea. The urea or choline chloride were commercially applied alone or with insecticides. Urea commercially applied to a field with a poor water-holding capacity and insufficient number of irrigations is much slower in correcting the crazy-top anther than that observed for choline chloride. Chemicals were not effective in correcting a field with a water penetration after irrigation of three to four inches.

Choline chloride or urea applied to non-crazy-top cotton failed to significantly increase the seed cotton yield.

How to Obtain Best Defoliation

■ **DR. HOWARD E. RAY,** Extension Cotton Specialist, University of Arizona, Tucson.

Plant Condition

Plants that get off to a good start in the spring, grow well throughout the season, and are in cut-out but still active at the time of defoliation are most apt to respond satisfactorily to chemical defoliation. Soil conditions, uniformity of

(Continued on Page 44)

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FOR SALE—Moss Cleanmaster lint cleaner in excellent condition. — Bradford Gin Company, c/o J. B. Fuqua & Sons, Milan, Tennessee. Phone MU 6-1451.

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FOR SALE—1959 Continental DFB lint cleaner complete with motors. Excellent condition. Ginned very little cotton.—Box H5, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE—3-80 direct coupled all-electric Continental, clean and mechanically perfect, new saws, ribs and brushes, Hinckley cleaner, Super Mitchells, CGC individual lint cleaners, drier and furnace. To operate or move. — J. R. Gathings, Luxora, Ark.

FOR SALE—Used Moss lint cleaners. Single and double units. Also F3 Continental gin stands and 5-11 lint cleaners. Call Oby Scott, SH-4-6665, 5512 Avenue G., Lubbock, Texas.

FOR SALE—4-60" Standard Mitchell feeders, good shape. Will sell cheap. Contact Smith Gin and Seed Company, Winder, Georgia.

FOR SALE—Continental DFB lint cleaner, A1 shape, ginned approximately 2,200 bales over two seasons. Complete with all supports, platform, piping, condenser discharge, fan and motor, and drive motor. Make us an offer.—Box 33, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE — Three Continental individual lint cleaners with bypass valves, steel supports, and lint flue connections.—Box B5, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE—3-stand gin with Murray 90-saw gins, 2-stage lint cleaning and drying, steel press, 96" cleaners and motors.—W. O. Pearcy, Altheimer, Arkansas. Phone PO 6-5153.

FOR SALE—One 3-80 saw Hardwicke-Etter gin, complete with 14' bur machine, cleaners, shelf-tower drier, down-packing press, RXIV LeRoi 200-h.p. power unit, seed scales, 16' wagon or truck scale.—J. L. Mullens, Phone 2-2753, Heber Springs, Arkansas.

FOR SALE

4-90 saw Continental automatic breast gins with feeders and unit lint cleaners that have been converted.

One 1960 DFB lint cleaner and all-steel down-packing press.

One 400 h.p. Climax engine.

If you need more capacity, late equipment, and better grades—this is it.

Eastside Gin Company
J. T. Longino
JONESTOWN, MISSISSIPPI
Phone EL 8-4302

FOR SALE—We are breaking up several outfits as follows: 4-80 Continental outfit with model 550 gin stands and 30 fronts, 4-67" special perfection feeders, Continental individual lint cleaners, automatic feed control, Continental seed scales with Roots blowing system and piping, above floor lint flue, 60" model 560 condenser with cat walk, Continental all-steel extra long box down-packing model 550 press with long stroke tramper, pump and 15 h.p. motor and V-drive, 200 h.p. AC electric motor with starting controls and V-drive, transmission, piping, 2-45" CI fans, 30" CI trash fan and drive—has ginned less than 5,000 bales of cotton, bought new 1956 and must be seen to be appreciated. Another 4-80 saw Continental Model C outfit complete as follows: 4-80 saw Model C gin stands with ribs, saws and brushes in top shape (will sell rib sections, saw cylinders, and brushes separately), 4-66" Mitchell Super units in good shape, 4-stand Mitchell conveyor distributor like new, Murray 24-shelf tower drier with Murray 52" V-drive inclined cleaner, 2M Murray burner, Murray double 35" fan with 50 h.p. motor, Murray 52" separator with by-pass, extra Murray vacuum feeder, blow box and all hot air piping complete. Also Gullett all-steel long box down-packing press, tramper and pump and electric motor and V-drive, 45" Murray CI fan complete with 40 h.p. motor and V-drive, all piping, telescopes, etc. All machinery in tip-top condition. Another outfit complete as follows: 3-90 saw late model Gullett gin stands, Gullett master feeders, Gullett conveyor distributor, complete Gullett 14-shelf tower drier with 6-cylinder blow-in cleaner and 2M burner, hot air fan, separator and piping to make the drier setup complete, Gullett all-steel short box press with tramper and pump, 4-35" fans, 1-25" fan, 1-40 h.p. electric motor, 1-D11000 Caterpillar diesel motor, steel building, and set Howe 30x8 wagon scales. Also, 3-90 saw Gullett gin stands—good shape, 4-80 saw Continental Model C gin stands, Murray all-steel down-packing press complete with Murray tramper and pump, 4-66" Mitchell Super Champs, several 60" and 66" Mitchell feeders that can be bought cheap and used as spare parts, several sheaves all sizes, floor stands, piping, telescopes, etc. Have 4 Munger saw cylinders complete with new saws and will sell cheap. Several 40" and 45" fans. This is good equipment and not junk.—Sam Clements, Phone RE 5-3764, Box 86, West Memphis, Ark.

SPECIAL BARGAIN FROM DORMANT GIN—Practically new Hardwicke-Etter Lintmaster lint cleaner, ginned only 800 bales since installation, complete with motors and fans and steel supports; and one all steel Lummus down-packing press complete with Lummus tramper, ram and casing and press pump, all for $5,000 at location.—R. B. Strickland & Co., 13-A Hackberry St., Phone: Day PL-2-8141, Night PL-3-2219, Waco, Texas.

FOR SALE—One Clipper seed culling machine, size 402, perfect condition. Priced to sell.—Lee McCulloch, Dawson, Texas.

FOR SALE—One 5-90 saw Continental outfit and one 5-80 saw Continental outfit, both plants to be moved. Machinery in excellent condition.—Sebastian Farmers Gin, Sebastian, Texas. J. A. Krueger, mgr.

FOR SALE—Three complete modern gins. To be moved. Equipped with driers, lint cleaners and steel buildings.—Jim Hall, 1503 Cotton Exchange Building, P. O. Box 751, Dallas, Texas, or telephone RI-1-1393.

FOR SALE—GINS: 3 late model 80-saw Murray for submerged lint flue. FEEDERS: 4-67" Master double-X Continental, reworked and painted. SEPARATORS: 1-70" Hardwicke-Etter, 2-52" Stacy. BURNERS: 1-1½M BTU Continental. Various size fans and other items. We are handling a variety of items on a commission basis. Let us know your needs.—Kimbell Used Gin Machinery Co., Box 456, Earth, Texas.

FOR SALE—5-1958 Murray combing lint cleaners, complete with three Hartzell fans with motors, all necessary motors and drives, by-pass valves and sheet metal connections from a submerged flue, $6,000.—Box I-4, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE— One Murray Big 60 lint cleaner.—Ed Davis, RoEllen Gin Company, Dyersburg, Tennessee. Phone AT 5-2896.

GINNERS—Do you have enough capacity? We have one of the answers for you.—Sam Clements, Phone RE 5-3764, Box 86, West Memphis, Ark.

FOR SALE—GINS: 5-90 '52 Model Murray, 5-90 '55 Model Hardwicke-Etter, 5-80 Hardwicke-Etter with hot roll boxes, split ribs and mote sections; 5-80 Continental F1 brush; 15-80 Murray; 9-80 Hardwicke-Etter, 4-80 Lummus double moting; 4-80 Lummus down moting; 10-80 Continental Model C brush (also AB); 6-90 Gullett; 1-90 Lummus; 4-70 Continental F3 brush. FEEDERS: Super Mitchells in 60" and 66", 5-80 Continental 4X, 10-80 Continental double X, 4-60 Continental double X. LINT CLEANERS: 2 Moss Super Cleanmasters, 1 Continental DFB, 1 Hardwicke-Etter Lintmaster, 3 Lummus combers, 15 Murray 1951 individuals, 6 Murray 1957 individual combing type, 10 Murray ABC Jets. BUR MACHINES: 2-10' Hardwicke-Etter, 1-14' Murray, 1-14' Stacy, 1-10' Lummus with 5-cylinder built-in aftercleaner. CLEANERS: 1 Murray 11-cylinder 72" V-drive blow-in, two 7-cylinder 70" Hardwicke-Etter V-drive blow-ins, 1 Lummus 96" 6-cylinder with green leaf and stick machine on back, 1 Continental 72" Impact, 1 Lummus 48" horizontal, 1 Murray 6-cylinder horizontal, 1 Hardwicke-Etter 6-cylinder airline, and one 6-cylinder Murray airline, 1 Hardwicke-Etter tower drier with built-in aftercleaner, 2 Lummus 10' Thermos, 1 Lummus 16' Thermo. PRESSES: 1 Hardwicke-Etter short box, 1 Murray short box, 1 Continental up-packing wood. CONDENSERS: 1 Murray 72" downdraft, 2 Continental 72" sidedraft, 1 Lummus 60" downdraft, 1 Hardwicke-Etter 72" sidedraft. SEPARATORS: 1-70" Hardwicke-Etter, 2-72" Continental, 3-52" Continental, 1-48" Lummus. BURNERS: from ¾M to 3M. TRAMPERS: 2 Hardwicke-Etter long stroke, 1 Hardwicke-Etter short stroke, 1 Murray short stroke. HULLER-CLEANER-FEEDERS: 5-90 1957 Model Hardwicke-Etter Green Leaf & Stick Machine. FANS: from 30" to 50". CONVEYOR DISTRIBUTORS: 5-90 Murray, two 5-80 Murray twin screw, one 5-80 Murray single screw. All the above equipment reconditioned and painted. —Bill Smith, P. O. Box 694, Abilene, Texas. Phones: OR 4-9626, OR 4-7847.

Reconditioned Murray 90 Saw Safety Gin

FOR QUALITY
RECONDITIONED
GIN MACHINERY
World's Largest Stock
CONTACT
BILL SMITH
P. O. Box 694 Abilene, Texas
Phones: OR 4-9626—OR 4-7847

FOR SALE—One complete 4-80 Continental cotton gin with Super Mitchell extractors; double drying, Mitchell Jembo, 6-drum incline cleaner, 4 Murray saw-type lint cleaners, Continental simplex all-steel press, all-steel gin building and all motors, fans, etc., to make complete outfit. Priced for quick sale. For complete details call or write, Swift & Company Oil Mill, Box 637, Augusta, Ga. Phone PA 2-7361.

FOR SALE—One Hardwicke-Etter Lintmaster. Good condition. Priced to sell. Write or wire Box 2, The Cotton Gin and Oil Mill Press, 3116 Commerce Street, P. O. Box 7985, Dallas 26, Texas.

FOR SALE TO BE MOVED—All-steel 3-90 Cen-Tennial gin plant with Super Champ Mitchell feeders, two 24-shelf tower driers, vertimatic burner, two Murray overhead cleaners, Moss-Gordin lint cleaner, Cen-Tennial all-steel, one-story, up-packing press, electric power, f.o.b. gin site, located in Arkansas.—Box 18, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

NEW STEEL GIN BUILDING

In Stock

36' x 106'—24' Wall
Double Wagon Shed

Erect On Your
Foundation—$11,000

For Any Size Building Call

MITCHELL STEEL BUILDING CO.

Phone Dallas: FL 7-6951
Phone Carrollton: COngress 9-2236
P. O. Box 456 Carrollton, Texas

FOR SALE—4-80 gin plant, all metal, 22-shelf drier, 2M BTU burner, 2-40" push and pull fans, 6-cylinder precleaner, impact cleaner, Mitchell extractors, hullers fronts, 4 Continental lint cleaners, Continental conveyor, Simplex down-packing hydraulic press, 100 h.p. electric motor, 65 h.p. electric motor, 1-45" fan. One 22-shelf drier, 2M BTU burner, 2-40" push and pull fans, 6-cylinder precleaner, 4 Mitchell extractors, Continental hullers fronts, Continental conveyor, no-choke dropper, 1-150 h.p. and 1-65 h.p. electric motors, up-packing hydraulic press, 1-45" fan. — Jesse C. Horne, Sr., Route 1, Marietta, Miss.

FOR SALE — Attractive price. Complete outfit equipped with 3-90 Murray safety gins, Mitchell Super Champ feeders, Cen-Tennial distributor, 4' 6-cylinder Cen-Tennial hot air cleaner, 3 Murray individual lint cleaners behind each gin, 1 Murray big 66" battery lint cleaner, 1 Murray all-steel, down-packing press, tramper and pump, all necessary transmission, metal piping, etc. Total ginnings approximately 4,500 bales.—Write Box 99, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE—Moss Super Cleanmaster, one reconditioned Moss Cleanmaster, Hardwicke-Etter Lintmaster and Lummus comber. Four late model Continental Model 560 unit lint cleaners. Three Murray saw type lint cleaners. One Sutorbilt, size 81, blower. One steel frame two-wheel trailer with practically new tires, one 12" vacuum with speed reducer and end type blow box attached. STEEL BUR MACHINES: 1-14' Hardwicke-Etter and Murray right-hand and 2-10' Lummus center feed. STEEL CLEANERS: 72" Continental Impact, 5- and 6-cylinder 52" Murray blow-ins with V-drive, 50" Continental inclines, 5-and 6-cylinder Hardwicke-Etter and two 6-cylinder Gullett blow-ins, 6-cylinder Stacy and Lummus Thermo. Murray and Hardwicke-Etter press pumps. 3-80 saw Murray glass front gins with Super Mitchells, complete with lint flue and couplings. New tower driers, Mitchell and Service Gin Company heaters, 9" screw elevator. New flat and V-belting and a general line of conveyor and transmission equipment. For your largest, oldest and most reliable source of used and reconditioned gin machinery, contact us. Call us regarding any machinery or complete gin plants which you have for sale or trade.—R. B. Strickland & Co., 13-A Hackberry St., Phone: Day PL-2-8141, Night PL-3-2219, Waco, Texas.

MOBILE PRECLEANING equipment for sale—A 26' x 8' mobile all-steel trailer with 18-ply tires, a 13" telescope, rock trap, 72" Continental stick machine, 45" Continental cast iron fan, 50" Continental revolving drum separator and complete discharge assembly. Powered by a 331 cubic inch Chrysler Industrial engine. This unit is complete, mobile, and ready to go—Box K20, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

FOR SALE—3-90 Murray all-steel outfit with individual lint cleaners, drier, cleaners, bur machine and all-steel up-packing press. — Sam Clements, Phone RE 5-3764, Box 86, West Memphis, Arkansas.

FOR SALE—3-80 Murray glass front gins with 66" Mitchell Super units, 1-14' Murray bur machine with LST stick and green leaf attachment, 1-52" Murray 7-cylinder inclined cleaner with vacuum front. All in good condition and at good price. — Jim Fullen, Ashport, Tennessee. Phone Ripley, Tennessee, 894-W.

Equipment Wanted

WANTED—One Bauer 199-60" seed cleaner. Must be in firstclass condition. — Planters Cotton Oil Mill, Inc., Box 897, Pine Bluff, Arkansas.

WANTED—150' of 15" piping, 45" bur fan, Continental individual lint cleaner (converted). — Pruitt Gin, Itasca, Texas.

WANTED—One Continental Model 555, 90-saw brush gin and Continental Perfection feeder. — Box G4, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

WANTED—One Moss Cleanmaster or Constellation lint cleaner. Must be in good condition. Box A14, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

WANTED—One wagon or truck scale 16' or longer. Quote price, make, size, and condition. Mail reply to Room 120, Whiteside Bldg., Lubbock, Texas.

Personnel Ads

POSITION WANTED—Man 47 years of age, 15 years experience in the gin field, capable of taking full responsibility of gin management.—Box 89, The Cotton Gin and Oil Mill Press, Dallas 26, Texas.

WANTED — Experienced gin superintendent to oversee two 5-90 plants. Job open now, submit application to Box 510, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

WANTED—Manager job for one or more gins. Have been in the gin machinery industry practically all my life. Have knowledge of cotton and seed handling, know every customer angle, am well versed in all makes of machinery as to weak and good points, can build a gin from the ground up, rate well with labor. Many ginners depend on me to recommend changes in their gins. Have had present job many years but want to make change. I am family man and want only a permanent connection. Could buy stock. — Box 3, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

WANTED—Position as manager or gin superintendent. 25 years experience including 15 with major gin manufacturer. References.—P. O. Box 485, Childress, Texas.

Power Units and Miscellaneous

SEE US FOR PARTS on all models Minneapolis-Moline engines and Seal-Skin belt dressing.—Fort Worth Machinery Company, 913 E. Berry St., P. O. Box 1575, Fort Worth, Texas.

PEDIGREED COTTONSEED
State Certified LANKART 57
State Registered MEBANE & ROWDEN
MALONE BROS.
Wills Point, Texas TR 3-2338
(State Registered Plant Breeders)

FOR SALE to be moved—All-steel Muskogee-type seed house, no handling equipment, 5,000-6,000 tons capacity. Also, other steel buildings—Box 24, The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas 26, Texas.

MELVIN U. TINSLEY
Cotton Gin and Oil Mill Evaluations
212 Commercial Bldg. Office: TW 3-3711
Sherman, Texas Res.: TW 3-4011

SALES—Service—Repair—Installation—All makes of scales. Used scales taken on consignment. Fairbanks-Morse distributor, 20,000 lb. test unit, large stock of used motor truck and railroad track scales.—Industrial Scale and Equipment Co., Phone OR 2-8336, 7014 Force St., Houston, Texas, and McAllen, Texas, Phone MU 6-1651.

FOR SALE—One Big Joe lift truck, Model 1086, battery operated, $400. One #601 bulkbinder stretcher, $30. One #616 bulkbinder sealer, $20. One electric Skil Cotton Sampler, Model 144, like new, $90. — McAlester Oil Mill Co., Box 275, McAlester, Oklahoma.

SCALES FOR SALE: **Authorized Fairbanks, Morse scale dealer. New and used scales. Guaranteed service anywhere, anytime—Lewis Scale Service, Clarence E. Lewis, 616 Avenue A, Lubbock, Texas. Phone PO 3-4271 or SH 7-1857.**

USED ENGINES FOR SALE—One pair 1210A, MM, 220 h.p.; one RSX1V, V-8 Le Roi; one L3000, V-12 Le Roi. For further information contact: Lubbock Electric Company, 1108 34th Street, Lubbock, Texas. Phone: SH 4-2336.

WANTED—Sheet metal work for cotton gins—blowpipe, ells, hi-efficiency cyclones, vertical type rock and green boll traps, special fittings, general repair work. — Emil A. Schroeder, Phone TW 8-3611, Thorndale, Texas.

PEDIGREED COTTONSEED
State Certified
Northern Star No. 4-11
THE DAUCHY GIN
Fentress, Texas
HU-8-2332 or HU-8-2400
(State Certified Seed Growers)

FOR SALE—Cooper-Bessemer 600 h.p., 400 RPM, Type JS-8, natural gas engine.—Andrus Engineering Co., Phone TU 2-4124, 608 Wilson Bldg., Corpus Christi, Texas.

FOR SALE—John Deere No. 6 corn sheller with pipe and storage bin.—Planters Co-op Gin, Bardwell, Texas. Phone 84.

FOR SALE—One No. 30 Mitchell butane vaporizer, capacity 30 gallons per hour or 3M BTU. Used very little, one-half new price.—Robert L. Dortch Seed Farms, Scott, Arkansas.

Brazil's Peanut Crop Up

Brazilian peanut production in 1961 is unofficially forecast at a record 535,000 short tons (unshelled basis), an increase of about 25 percent over 1960.

This high output will result from a projected acreage expansion of about 15 percent and an expected 10 percent increase in yields.

Cowan Receives Award

JOHN C. COWAN, chief of oilseed crops, USDA Northern Laboratory, Peoria, Ill., has received the Alton E. Bailey Achievement Medal "in recognition of outstanding research contributions to the technology of soybean oil."

The medal is awarded annually by the North Central Section of American Oil Chemists Society. Cowan, the first organic chemist thus honored, is the third recipient of the Bailey Medal.

The Country Needs a Book

International Order of Yo-Yo

By B. Ubberson

CHITLING SWITCH, ARK.

DERE MR. EDITOR:

It aint none of my business I guess but it looks to me like this here feller Kennerday is making so many appointments for this that and another that he dont know whether he is appointing ex-governors or hoe hands. He appointed some feller to be something in Africa and this feller was a ex-Gov. whose state was all messed up and in money trouble and has now messed things up in Africa and has made Europe kind of sore about some things he said.

He appointed some feller as under-Sec. because the Gov. of the state where the feller come from said he would not hep him no more than a 5-yr. old kid would hep him. He appointed his brother as Atty. Gen. which was natural jest like that there feller Clayton raised his Sec.'s salary because she was his wife and they aint nobody kicking about that except maybe a few egg-head taxes payers that dont know no better.

It kind of minds me of that there old joke about the colored man who reported late to work one morning for the first time in his life and his boss ast him what was the matter and the darky replied that he had gone to a party the night before and won second prize and jest couldnt hep it. The boss ast him what was the second prize if it kep him so long. The boy replied that it was sleeping with the hostess and the boss glared at him and said—well, what in heaven's name was the first prize? The boy looked sort of sheepish and said: "Fo' bits."

Mr. Kennerday won the first prize all right and he has got it—and I dont know the rank of these here other prizes but I think it is downright shame that he dont appoint Hairy Truman to be under-Sec. of something that would require that he must keep his mouth shet. Theys nothing would please me more than listening to that owl head say nothing and keep on saying it. I aint got nothing agin him—the only thing is that he makes a lot of people sore by trying to tell what a big man he is and was—and they think he is not nothing but a yokel.

I don't like to see people git sore. It dont hep this here country none at all—more special when they git sore at each another. What we need is for some woman to write a book or something and git folks riled up about this here International Order of Yo-Yo Fishermen trying to regulate the Tropics of Caprycorn.

YOUR'N,

B. Ubberson

■ **JOHN E. TULL, JR., of Lonoke, Ark., will represent Arkansas Seed Growers Association on the Arkansas State Plant Board, succeeding L. G. BLACK of Corning.**

• Corn Products Plans Nutrition Institute

CORN PRODUCTS CO. will establish an Institute of Nutrition to "relate modern nutritional science to food processing", according to William T. Brady, Company chairman.

Dr. Albert L. Elder, who has served as coordinator of research of Corn Products, will direct the work of the Institute.

Discussing the Institute's function Brady said, "The new Institute will help us cope the problems of overnutrition and malnutrition, in both of which private industry must play an increasingly effective role."

New Mexico

Ginners Set Annual Meeting

New Mexico Cotton Ginners Association has slated its annual meeting for June 19-20 in Albuquerque. Western Skies Hotel will be convention headquarters, according to Secretary-Treasurer Winston Lovelace of Loving.

Association officers, in addition to Lovelace, are President Luther Thomas of Portales and Vice-President Neil Hartman of Hatch.

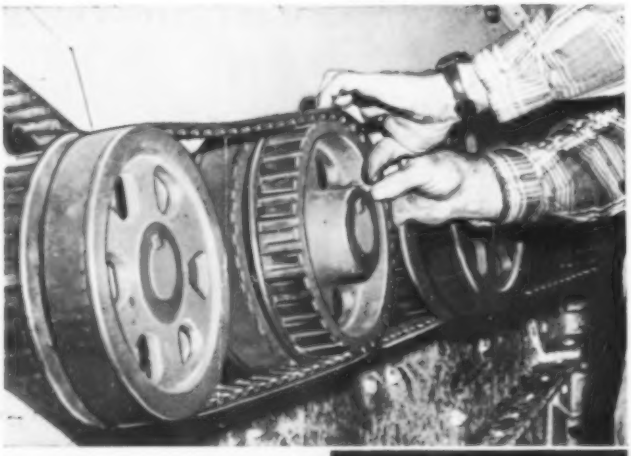
PCG Increase Grants

An increase in research grants by Plains Cotton Growers, Inc., has been approved by the board of directors.

The grants, totaling $31,500, show an increase of $6,500 over the total for the previous year.

The additional $6,500 will be used for work on seedling diseases in cotton and weed control work.

New, Wood's Cotton Cleaner Drive boosts production, cuts maintenance



Wood's new Cotton Cleaner Drive can't slip. It maintains accurate driven speeds, delivers full power to the cylinder train, minimizes choke-ups and provides much greater output than conventional v-belt drives. Maintenance and downtime are greatly reduced. Belts won't stretch . . . do not require idlers or retensioning. Belt replacement or complete drive installation can be made in much less time and without spreader, pull-off or other special tools. Wood's Cotton Cleaner Drive can pay for itself in less than one season. Get complete details.

write for Bulletin 16103

Woods

T. B. WOOD'S SONS COMPANY
CHAMBERSBURG, PENNSYLVANIA
ATLANTA • CAMBRIDGE • CHICAGO • CLEVELAND • DALLAS

CC/260

New Developments in Cotton Gin Machinery

The information and statements appearing in this department are furnished by the manufacturer of the equipment.

WITH THE INTRODUCTION of the 80-18 Gin, The Murray Company of Texas, Inc., claims another "industry first."

"Continued research and development has enabled us to be the first manufacturer to incorporate 18 inch diameter saws into a gin," the company says.

The manufacturer claims the 80-18 Gin will give a positive increase in usable capacity, up to four bales per hour, without a loss in quality.

The 80-18 cleans seed perfectly with extra-loose roll while ginning at all rates of speed and regardless of seed sizes, all completely automatically, they say.

The design of the 80-18 Gin was projected from the successful 12-inch Saw Gin that has gained the confidence of ginners the world over, explains Murray. The new gin has been engineered with increased strength in all necessary members and is a compact unit that will interchange with 80- and 90- Saw Gins without using any additional space.

In addition to conserving valuable space, the 80-18 Gin contains a reciprocating mote bar for superior moting. No additional air blast pressure over that of a conventional 12-inch Saw Gin is required. Also the centerline of the saw shaft is the same height from the floor as conventional 12-inch Saw Gins so that the new unit can be set right in line for direct connection with present facilities, the manufacturer points out.

"The 80-18 Gin was field-tested during the past ginning season and produced amazing results," Murray reports, adding that the 80-18 Gin is completely adjustable and can be set to assure trouble-free operation.

Some of the features which Murray says makes the 80-18 Gin a superior unit are: heavier 18-inch diameter saws; full length ribs stationary at both ends; two-way adjustment on the huller ribs; adjustable seed channel; wide adjustment on outer roll box scroll sheet; new angle of picker roller teeth will discharge more hulls, trash and foreign matter; reciprocating mote bar; larger 9-inch mote conveyor for handling increased moting and efficient doffing by a precision air chamber.

• New Officers, Directors Named by CCI

A. E. HOHENBERG, president of Hohenberg Bros. Co., Memphis, was elected president of Cotton Council International at the annual meeting.

Other officers elected to serve with Hohenberg include: Keith Walden, producer, and president, Farmers Investment Co., Tucson, vice-president; Francis J. Beatty, Charlotte, N.C., treasurer, and William Rhea Blake, re-elected vice-president and executive secretary.

New directors, elected for three-year terms include E. H. Evans, Jr., Laurinburg, N.C., and A. L. Story, Charleston, Mo.

Re-elected directors are Harry S. Baker, Fresno, Calif.; Dupuy Bateman, Houston; Everett R. Cook, Memphis; R. Houston Jewell, Chickamauga, and J. R. Kennedy, Bakersfield.

Cotton School Slated

The fifty-second annual Summer Cotton School will be held at Texas A&M College, College Station, June 5-July 14.

The school will be conducted by the department of agricultural economics and sociology, under the direction of J. M. Ward.

Use It, Or Lose It

Acreage Release Program Moving in N.C.

Plant, release, or lose it!

This is the word county leaders are trying to get across in North Carolina to 1961 cotton allotment holders. (See Jan. 21 issue of The Press, Page 12.)

A total of 44,529 acres of cotton had been released through Feb. 24, according to North Carolina Cotton Promotion Association. This indicates the release program in that state is ahead of last year. Their total for 1960 was 58,627 acres.

Final totals won't be known in the area until late in April, but deadlines are bearing down on most of the state.

Acala Cotton Tightens Grip On San Joaquin Valley

Acala cotton tightened its grip on the San Joaquin Valley with the passage SB 23 by Senator James A. Cobey of Merced County, Calif.

The bill, designed to strengthen the San Joaquin Valley One Variety Cotton Act, will allow the director of agriculture or the agricultural commissioner to abate all cotton plants not of the Acala variety.

The bill was passed by the assembly last week and sent to Gov. Edmund Brown.

REX SEED, INC. • PARKIN, ARK.

Texas Ginners Journal And Yearbook Issued

Texas Cotton Ginners Journal and Yearbook is now off the press.

This year's copy contains 60 pages of advertisements and editorial matter pertaining to what has happened to cotton in Texas in the last year.

The new publication features research activities, both in ginning and production practices, and how these have aided cotton in the Lone Star State.

Copies are available at Texas Cotton Ginners Association office, 3724 Race Street, Dallas.

Oklahoma Exchange Elects

Oklahoma State Cotton Exchange has elected J. Robey Smith of Frederick as president for the coming year. Other officers and directors, announced by Mrs. Bill Rasco, secretary-treasurer, include: Vice-President James E. Kilgore, Muskogee; R. Z. Bailey, Vernon; Amos K. Bass, Durant; Ivy Brown, Clinton; R. A. Cantrell, Dallas; Elwood Hopkins, Chickasha; Bill Quattlebaum, Elk City, and J. C. Styron, Hobart.

New Soybean Plant

A new soybean processing plant will be ready for the 1961 soybean harvest according to an announcement by A. W. Perdue & Son Co., of Salisbury, Md.

The plant will be a solvent extraction type plant and is expected to process from 20 to 30 percent of Delmarva's bean harvest.

Swift Executive Retires

E. F. CZICHOS, a veteran of 46 years in the cottonseed oil mill industry, has retired from Swift & Co.

Since 1956, he has been assistant head, oil mill department, in Swift's general office at Chicago.

Czichos and his wife, the former Marie Pfaeffle of Waco, will return to Waco where Czichos began his career with Swift in 1915.

A native of Cameron, Texas, Czichos is a veteran of World War I and a Rotarian. He and his wife have one son, Erwin, who is assistant treasurer of the System and Development Corp., Pacific Palisades, Calif.

• Clarke Heads Arizona Cotton Growers

DAN W. CLARKE, Tucson, re-elected president of Arizona Cotton Growers Association at their annual meeting, is now in his fifteenth straight year as an Association officer.

James S. Francis, Phoenix, has been named chairman of the board; Farrell C. Layton, Thatcher, first vice-president; Elmer Emrick, Somerton, second vice-president; and R. L. Hale, Marana, third vice-president.

Other officers include Bill C. Rhodes, Avondale, secretary-treasurer and E. S. McSweeney, Phoenix, executive vice-president.

New Bulletin

QUALITIES OF ACALA 1517D OUTLINED FOR GROWERS

What to expect from 1517D, a new variety of cotton developed at New Mexico Experiment Station is outlined in a new publication.

The research report is by Glen Staten, agronomist, who developed the variety. Seed for 1517D will be available commercially in 1962.

"Acala 1517D, A New High Quality Cotton Variety for New Mexico" may be obtained from county agricultural agents or from the Bulletin Room, New Mexico State University, Box 757, University Park.

Long Staple Tested for Sheets

USDA research agencies are making extensive tests of wearability of sheets made from long staple cotton.

WANTED !

More men like Preston Lyda, Manager, Anton Producers Co-op Gins, Anton, Texas, recently named outstanding co-op ginner of 1960, and other ginners who work with cotton producers in improvement and preservation of cotton quality, and other matters of benefit to the cotton industry.

Our thanks and appreciation.

Plains PCG COTTON GROWERS, INC.

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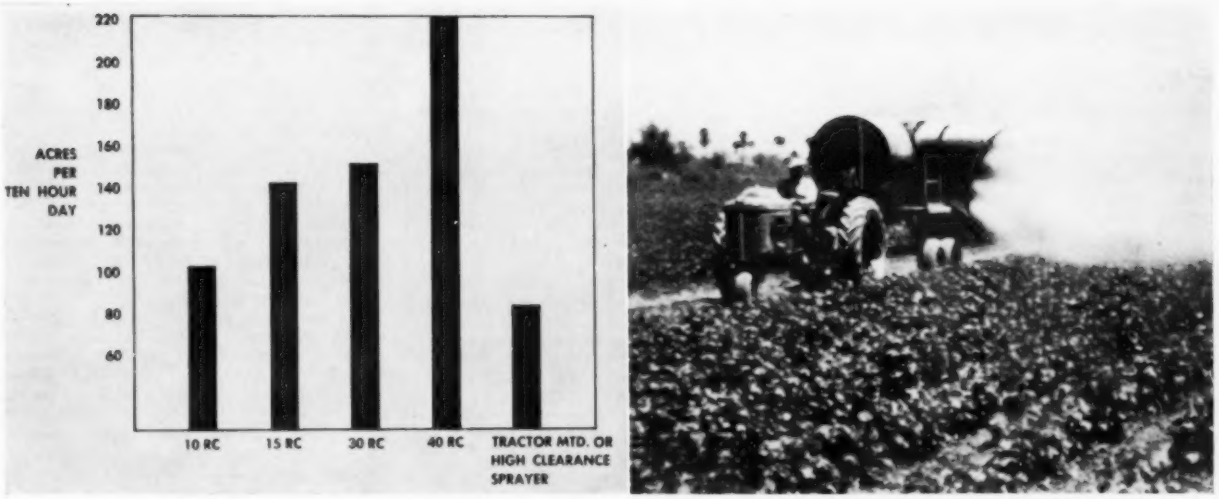

A JOHN BEAN SPRAYER is shown in action, with a chart comparing different types of sprayers.

New Catalog

JOHN BEAN SPRAYERS FOR COTTON DISCUSSED

Fast, economical spraying of cotton is discussed in a new catalog available from John Bean Division, Food Machinery & Chemical Corp., Lansing 4, Mich. Title of the publication is "John Bean Sprayers for Cotton."

The firm points out that it has pioneered the development of faster chemical application on test plots and large commercial cotton acreages.

John Bean engineers compared the capacity of three types of sprayers in intensive field tests. Air type mist sprayers out-distanced tractor-mounted and high-clearance rigs by as much as 130 acres and more per 10-hour day. Tractor-mounted and high-clearance sprayers covered about 85 to 90 acres per 10-hour day, while the largest capacity John Bean Aircrop Sprayer, the Model 40-RC, covered up to 220 acres per day.

Even the smallest Aircrop spraying attachment was rated at 100 acres per day. According to engineers, the crop coverage of the air-type sprayers was as good or better than the conventional rigs.

Per acre spraying costs were also measured. John Bean Aircrop operating costs were up to 67 percent lower than airplane spraying, and, under some conditions, 30 to 50 percent below high clearance equipment. Greater swath width and larger tank capacity enables the air-type sprayer to cover more acres per day than the high clearance rigs at virtually the same hourly fuel and labor cost.

Savings of $7,500 can be realized over a total of 10,000 acres sprayed annually by using these air-type sprayers versus aircraft application. Cost figures used include equipment write-off, maintenance, fuel, oil and manpower, the firm estimated.

John Bean manufactures virtually every type of sprayer for cotton growers including boom sprayers, Hi-Crop high-clearance self-propelled sprayers and Aircrop Sprayers.

There are two complete Aircrop models. There are also three attachments that will convert most any high pressure sprayer into an air-type unit.

Model 40-RC Aircrop features a 500-gallon spray tank, protected against rust and corrosion by a special Bean-Bond lining process, a self-priming pump with a capacity of 120 gpm at 75 pounds pressure and new remote controls that allow one-man sprayer operation from the tractor seat.

The new 30-RC Aircrop, a complete sprayer unit for medium-to-large acreages, has a pump capacity of 112 gpm at 65 pounds pressure. A 400-gallon Bean-Bonded spray tank is standard, and a 500-gallon tank is offered as optional equipment.

All Aircrop cotton sprayers are specially designed to elevate the spray outlet above the crop.

The three Aircrop attachments are available in a wide choice of capacities.

The new 20-RC Attachment for medium-to-large acreages is especially suited for use on high pressure sprayers with 15 gpm or more pump capacity.

The Model 10-RC Attachment is specifically designed for cotton growers with small acreages.

All attachments feature 200-degree rotation of the air discharge head to allow the operator to take advantage of wind conditions, and all are adjustable to the spraying height desired.

Adjustability of the air vanes within the air discharge section is another major Aircrop feature. Controlled right from the tractor seat, the vanes can be adjusted to control the spray direction on uneven terrain to assure complete crop coverage.

Hercules Executive Retires

Dr. Wyly M. Billing, vice-president and pioneer in rosin and terpine manufacturing, will retire from Hercules Powder Co., effective April 1.

Billing, who has been with Hercules 35 years, was named chief chemist in 1931.

". . . saved $3,989.61 on cottonseed" with SEED-O-METER in 1960—

says S. L. (Sam) Smith, Manager, Frio Gin Company, Pearsall, Texas

"MONEY SPEAKS LOUDER THAN WORDS. Since the installation of a SEED-O-METER in the Frio Gin Company for the 1960 ginning season this Company has saved $3,989.61 on cottonseed.

"This dollar savings is the direct result of the use of SEED-O-METER instead of the method used during the 1959 ginning season. Need we say more?"

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Western Cotton Conference

(Continued from Page 37)

stand, irrigation, fertilization, insect control and weed infestations all play a part in determining plant condition.

■ LAND AND SOIL CONDITIONS. For best results in production and defoliation, plant cotton on relatively uniform land which has been properly graded to permit adequate and even greater water penetration. Unfortunately, this is not always possible, as Western cotton growers are often plagued with diverse soil conditions which result in uneven plant growth and maturity.

■ STAND. Defoliation is easiest in even stands with uniform plant development and maturity. If your stand is uneven and plant development and boll maturity are irregular, defoliation also will probably be irregular and incomplete.

■ IRRIGATION. Provide your cotton crop with a consistent, adequate supply of moisture during its growth and fruiting life. Delay of a single irrigation at a critical period may lead to unsatisfacory results when you attempt to defoliate. Excessive irrigation and fertilization may lead to lush, rank growth, defoliation difficulties, and troublesome regrowth.

The last irrigation is the most important moisture factor relating to defoliation. Time your last irrigation and permit bolls to mature before temperatures are too low for effective defoliation, but with sufficient moisture remaining to maintain active plants at the time of defoliation. It is impossible to specify an exact date for the final irrigation as this will vary with soil type, expected fall temperatures, etc.

■ FERTILIZATION. Provide sufficient but not excessive amounts of fertilizer for your cotton. Adequate fertilization is needed to insure continuous plant development and top yields. Too much fertilizer, especially nitrogen, can result in rank growth, leaves which will not defoliate, late immature bolls, and a regrowth problem. Nitrogen applications made too late in the season can cause similar difficulties.

As with irrigation, it is impossible to specify a "best" rate of fertilization or a "best" time to apply fertilizer. In general, however, 50 to 200 pounds of nitrogen per acre are adequate under Arizona conditions, and applications later than July should be avoided.

■ INSECT CONTROL. Serious insect control injury can cause defoliation problems as well as reduced yields. For example, early insect damage which knocks off the squares through June will result in a delayed fruit set, more rank growth, and delayed maturity in the fall.

■ WEEDS. You will find it difficult to obtain uniform leaf coverage with defoliants on yields that are heavily infested with weeds. Also, vigorously growing weeds may not be affected by defoliating chemicals and will consequently interfere with machine harvest.

Temperature

Apply defoliants when temperatures are relatively high to obtain the best and most rapid leaf drop. Successful defoliation is very difficult to achieve when maximum daily temperatures average below 60 to 65 degrees Fahrenheit. Also, night temperatures below 55 degrees Fahrenheit are not conductive to good defoliation.

Timing

Applying defoliant too early will result in the loss of top immature bolls, or at least cotton from such bolls will be inferior in quality and yield. Applying defoliant while plants are growing rapidly and have many immature leaves will result in a poor leaf drop. Applying defoliant too late may result in a poor leaf drop due to low temperatures. Applying defoliant to too large an acreage at the same time may result in serious regrowth in some fields before they can be harvested. Timing is important.

■ MATURITY. In a boll that requires 50 days to progress from open bloom to open boll, 18 days are required for full development of fiber length, and 45 days are required for full development of strength, thickness, and boll weight. It might be expected, therefore, that defoliation which stops development earlier than about 45 days could have deleterious effects on certain fiber properties.

■ HARVEST PROGRAM. Consider your harvest facilities in deciding when to defoliate. Mature bolls open rapidly after the leaves fall. If harvest does not follow very soon, tender regrowth may become a serious problem. For this reason, stagger your defoliant applications if harvest facilities are limited.

The final decision on when to apply defoliant must be made by each grower

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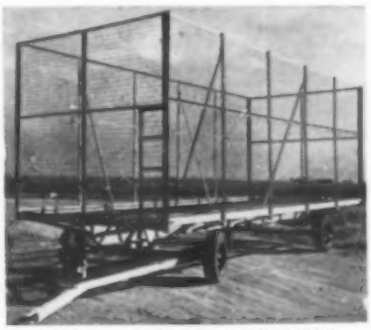

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considering plant condition, maturity, weather, and the harvest program.

Coverage

Each cotton leaf must be covered with defoliant to promote a good leaf drop. When applying by air, use a flagman to insure complete coverage.

Multiple treatments may be necessary in rank cotton. In the West, two applications about 10 days apart of a chlorate-type defoliant have been used by many growers. In some instances, an application of chlorate-type defoliant has been followed by application of a desiccant such as pentachlorophenol.

Materials

Phospate defoliants were used in Arizona during the 1960 season for cotton and early complete defoliation while temperatures were high. Chlorate-type defoliants were more widely used overall, however, especially during the latter part of the season. Both types of material provide satisfactory defoliation when used under the proper conditions. None of the available materials are completely satisfactory under the wide variety of conditions which exist each fall, however.

Preliminary work at the Cotton Research Center near Phoenix in 1960 indicated considerable promise for a combination defoliant-desiccant application. Very good success was obtained late in the season, but it will be necessary to repeat the work this year to determine effectiveness earlier in the harvest season.

Whatever material is used, check directions for its use carefully. Generally speaking, lower rates will be required for small plants during the warm weather, and higher rates will be required on large plants or during cool weather.

Regrowth

As has already been mentioned, regrowth can be a serious problem if moisture and nitrogen supplies in the soil are excessive at the time of defoliation, or if too long a time elapses between defoliation and picking. This in turn may result in green-leaf stain in machine-picked cotton. This problem can be held to a minimum through careful attention to the factors discussed above.

Effects on Fiber Quality

Defoliation or desiccation has no deleterious influence on cotton in bolls which are open or which are fully mature, although not yet open at the time of defoliant application. This was the conclusion drawn from results of 11 tests in five states over a three-year period. The effects which were reported are summarized below:

■ LENGTH. The upper half mean length of cotton fibers was not significantly affected.

■ STRENGTH. Effects of premature defoliation on fiber strength were variable. In no case were the fibers weakened, and in some cases significantly stronger fibers resulted.

■ FINENESS. In six of 10 tests, premature defoliation resulted in significantly finer fibers.

■ SPINNING QUALITIES. Yarn skein strength was not consistently altered by premature defoliation.

■ YARN APPEARANCE was not consistently altered when tests were viewed on a total crop basis. Considering only effects on late-harvested cotton, however, a distinct trend toward lowering of yarn appearance grade was noted where cotton was defoliated prematurely.

■ PICKER AND CARD waste also showed little overall effect of premature defoliation, but there was a trend toward increased waste on early-defoliated, late-

■ NEPS were rather consistently increased by early defoliation.
harvested cotton.

Mechanical Harvesting Costs and Quality

■ **T. H. SIEK**, Producer, Peoria, Arizona.

I am a cotton producer located in the Waddell area. The material that I am presenting today was prepared by the Valley Gin Co. and is, in effect, an extension of a report that was given to you three years ago.

The year 1961 certainly presents its share of problems relative to cotton in our Southwestern area. Obviously, lower costs in both production and harvesting are desperately needed if we wish to remain in the cotton business.

Let's assume that the average Southwestern production cost is $137 per acre. Now let's further assume that average yield for this cost is two bales per acre. All of you would agree that if a single method or procedure were developed by which you could affect a 20 percent savings in your production cost (and let me point out that this, in the above case, would result in a $27 per acre savings) that you would unanimously acclaim this to be a major and significant step in the right direction. If this average grower is hand-harvesting his two bales per acre, he could be spending as much as another $137 per acre for harvesting his crop. For this very reason, since harvesting alone has become our biggest single cost, I am going to attempt to show you even more than a 20 percent savings in harvesting.

Before we analyze various methods and costs involved in harvesting, let me briefly explain the methods used in obtaining figures. The figures that I'm going to discuss with you cover more than 6,400 bales of cotton, harvested in the following manner: Hand picked by locals; hand picked by nationals; snapped by locals; machine picked; and last but not least, picked up off the ground both by hand and with Rood machines. Each method was analyzed from a standpoint of: lint turn out, seed factor, percent of trash, field loss, average actual selling price, value per bale, net ginning credit or cost per bale, picking cost per bale, and last and most important, net return per bale before growing cost.

Hand Picked Average

First, here is the weighed average of all hand picked cotton analyzed. This includes harvesting by both locals and nationals and both picked and snapped. This covers some 2,626 bales of cotton produced on 1,268 acres, giving us an average yield of 2.07 bales per acre.

Average lint turn out was 29.76 percent.

Seed factor was 1.76 percent.

Trash was 17.36 percent.

Average actual price was 32.1 cents.

Value per bale was $161.55.

Net seed credit per bale was $2.05.

Picking cost was $59.12.

I should like to briefly explain this picking cost figure. First of all, the picking rate paid ranged from $2.75 per hundred paid for snapping to $3.84 per hundred, paid to nationals for picking (including all other cost incurred by the use of nationals). The costs per bale ranged from a low of $58.00 to a high of $60.00 and on a weighed average cost would be $59.12 per bale.

Net return per bale before cost was $104.48. To me, this is the most significant of all figures, for this $104.48 rep-

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resents the average net return before growing cost per bale for the 2,626 hand picked bales of cotton in this analysis.

Machine Picked Average

Secondly, we have the weighed average of all machine picked cotton analyzed. This covers 3,828 bales of cotton produced on 1,551 acres, giving us an average yield of 2.47 bales per acre. This yield difference, as is compared with hand picked, is because of factors other than harvesting and for the moment our interest is harvesting alone.

Average lint turn out was 30.09 percent.

Seed factor was 1.67 percent.

Trash was 16.97 percent.

Field loss was 14.36 percent.

Average price was 30.93 cents.

Value per bale was $154.65.

Seed credit per bale was $1.08.

Picking cost per bale was $26.15.

Let's once again analyze this picking cost figure per bale. The University of Arizona in September, 1954, published "Cost of Harvesting Upland Cotton in Arizona", Bulletin No. 259. In this bulletin the conclusion is reached that it cost approximately $15 per bale to operate and maintain a one-row cotton picker.

With this information, plus the actual records of a custom operator who harvested 1,250,000 pounds of seed cotton, interviewing the individuals involved in this analysis, I have come to the conclusion that this figure of $15 per bale fairly represents the total cost of operating a one-row cotton harvester. One might ask then, "How did you arrive at $26.15?" This difference of $11 represents the cost of recovering the 14.36 percent field loss and a very small amount of hand picking. Therefore, by combining these figures through weighed averages, we can arrive at our average picking cost per bale of $26.15.

Net return per bale before growing cost was $129.58. Once again, we have now arrived at our most significant figure, $129.58, which is the average net return before growing cost per bale for the 3,828 machine picked bales in this series.

Let's see how they look side by side:

NET RETURN PER BALE BEFORE GROWING COSTS

Hand Picking	Machine Picking
$104.48	$129.58

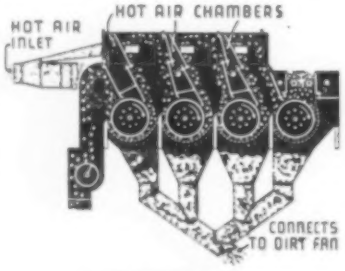
Inasmuch as there are years in which this field loss cannot be recovered, let's see what happens if we assume that our average field loss of 14.36 percent should remain a total loss. We must subtract $18.61 from our $129.58 giving us $110.97. It is interesting to note that machine harvest is ahead of hand picking.

Another question that might be asked is "What if you machine pick and pay a custom rate of $2 per hundred." We can see that, even in this event, we would only lower our $129.58 figures by $7.07 to $122.51 which still gives machine harvest the biggest return.

It is obvious that you can not pay a $2 custom rate and then fail to gather the field loss. That would make hand harvesting slightly more economical.

I should like to point out, also, that those individuals involved in this study who recovered their field loss with Roods, did so on a custom basis. This, coupled with using weighed averages over a three-year period, resulted in the full effect of the Rood as a gleaning method not being properly reflected. The Rood, if properly operated, appears to be a more economical method of gathering ground cotton. I am sure that our next production conference figures will be available comparing the Rood versus hand gleaning. Assuming that Rood is a more economical gleaning method, it will only widen the already wide spread between hand harvesting and spindle picking.

These figures, which already clearly show the advantage of machine harvesting, have held steady each year over the three-year study. Comparisons are on 6,400 bales, including many varying types of operations. These comparisons have covered all varieties produced over the past three years from Red Star to Delta Pine and the Acalas. During the three year period, we have had the wettest fall on record and the driest fall on record—still the difference is $25 per bale. Applied back to the average yield on the machine harvest operations, it means an increase in net return of $62 per acre.



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Our Ginning Program

■ **SAUL A. JOHNSON**, Manager, Chandler Gin Company, Chandler, Ariz.

Presented by

■ **MARVIN MORRISON**, Director, Chandler Gin Co., Chandler, Arizona.

The Chandler Gin Co. is owned and operated by growers in the immediate area. This has enabled the producers to learn that ginning has its share of problems.

Our operating procedures vary little from other gins in the area. However, they do reflect a desire of producers to do whatever is economically feasible to protect quality. I said "protect quality" because a gin can't put quality into cotton. We accept the responisibility of preserving quality and turning out the best sample possible.

Handling and Ginning

The following methods are used in handling and ginning at our five installations.

When cotton is weighed in, a notation is made on the gin ticket describing method of harvesting. Trailers are grouped and ginned accordingly. Trailers are also grouped by individual producers when it can be done in a manner which will give fair ginning time to all customers. This prevents gin stands from running dry as often, and cotton from an individual producer is usually in the same condition. This necessitates fewer changes in equipment settings.

Each trailer is tested with a moisture meter. If moisture content is unusually high, it is put aside for special treatment and possibly ginned with other cotton in similiar condition. Our experience has been that when the moisture content of cotton on the yard is much over 10 percent, ginner and producer can expect difficulties.

Most of the cotton we receive is examined in the trailer either by the gin manager or an experienced cotton classer. If the cotton shows excessive spindle twist, foreign matter, moisture, etc., the producer is contacted to see if he can improve the condition of cotton prior to delivery to the gin.

Approximately 10 percent of our cotton is examined after ginning to determine whether, in the opinion of the classer, it was properly ginned. He looks for overheating, ginning too close, rough preparation, etc. Evidence of poor ginning practices are reported immediately to the gin manager who works out the problem with the gin superintendent. Cotton can certainly be mishandled in any gin. However, we believe it takes both producer and ginner to turn out high quality.

We have found that suggestions to producers on harvesting situations which influence grades are most welcome. One producer started last season using hand pickers. Approximately 35 percent of his cotton was being reduced due to grass. Our classer reported that the gin was doing all it could under the circumstances. He contacted the grower, who instituted some changes in the field. Afterward, only two percent was reduced because of grass. While our job is to gin whatever is delivered, a producer appreciates knowing the reason for grade reductions. He will correct the situation if economically possible.

Our company has completed two seasons with automatic samplers in all the gins. They have been mechanically sound and we consider them successful. We are particularly careful and concerned about controlling the heat for drying. One of our gins was equipped this past season with a device which narrowed heat variation. We found this system preferable to systems that are either completely on or off. We plan to install similar equipment in the other gins.

Gins Are Repaired

The gins are thoroughly repaired prior to each season. The company employs a gin superintendent, assistant superintendent, and a head ginner for each gin. These men become the repair crew during the off season. Other employees are hired on a seasonal basis, and this can cause serious problems. Since we are

not likely to solve this in the near future, we believe simplicity of operation is a desirable feature in ginning equipment. Head ginners are housed on the property and develop a sense of loyalty to the company and its customers. This is not particularly true of temporary employees.

Picking up cotton off the ground behind mechanical pickers has become common practice in our communities. This usually contans a high percentage of foreign material. The company installed additional equipment in two gins to prepare such cotton for ginning. Cotton is simply removed from the trailer, run through a burr machine and an incline cleaner, then returned to a second trailer to await ginning. Testing has shown this neither reduces turnout nor improves grade. Chief benefit is that it can be ginned at a normal rate and reduces wear on inside piping and equipment. One or two men can operate the outside cleaners. Some of this cotton gins very slowly if it is not pre-cleaned and ties up an entire crew. This is particularly important during rush periods.

A perennial problem is the disposal of gin trash. Each gin has two large trash trailers as a part of its standard equipment. We contract with farmers who want to place this in their fields or use it with livestock. It has proven far more satisfactory to deal with one farmer, rather than several, at each gin. When even two were involved, we experienced periods when neither was ready to use it.

Our bookkeeping methods are standard with complete sets of records at each gin and a master set at the main office. These are all balanced monthly or more often should a customer request a statement.

Communications are very important during the ginning season. We have two-way radio systems in care of the manager, head of the accounting department, gin superintendent, and assistant gin superintendent.

Real progress has been made in ginning machinery in the past few years. There is every reason to believe that improved equipment will continue to be available. Good equipment is expensive and the ginner is caught between his costs and keeping the cost of ginning to the farmer as low as possible. The cotton ginning business is competitive and producers can expect to have good service and enjoy the benefits of new developments which are economically sound.

Get to know your ginner and learn all you can from him. He has no secrets on ginning your cotton. The two of you can work together to preserve the quality of your product through careful harvesting and ginning.

Fiber Quality Research

■ **DR. LESTER P. BERRIMAN,** Supervisor, Chemical Engineering, Stanford Research Institute, South Pasadena, Calif.

Our research on cotton drying have been purposefully very broad and have led to the discovery of three areas of changes occurring in the fiber due to extensive drying. They are:

1. Changes in location (bonding) of water in the fiber.
2. Permanent changes in the physical shape of the fiber (increase in the number of convolutions).
3. Changes in the chemical structure and physical properties of the fiber surface.

Surface Changes Being Stressed

At present we are concentrating on changes occurring on the fiber surface because it is so important and can explain many of the problems encountered with overdried fibers, such as poor spinning and drying, increased nep formation, and decrease of chemical activity as measured by reactivity with cross linking agents.

We have found fiber wax particularly sensitive to heat, which results in changes in its chemical composition and "apparent" loss as measured by our ability to extract the wax from the fiber after drying. Major changes noted occur at temperatures above 212 degrees Fahrenheit. Several compounds not yet identified have been found to be given off by fibers drying in the above temperature range. We also have found that the rate of wetting of cotton increases and dying characteristics change again, mainly on fibers dried above 257-298 degrees Fahrenheit. The frictional characteristics of the fiber are also changed.

We have found no change in overall fiber structure (as determined by infrared) with heat. Considering the above mentioned changes, this indicates the changes occurring are mainly on the surface.

Since fiber shape is important in spinning, finding permanent changes in fiber

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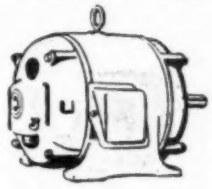

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shape can be caused by overdrying is very significant. These changes are mainly an increase in the number of convolutions in the fiber. New convolutions appear at low drying temperatures, but are not permanent unless the fiber is heated above 298 degrees Fahrenheit. We found the new convolution forms in only those areas of the fiber which are under stress. These areas of high stress have now been shown to be fibril reversals and show up as black or dark bands around the fiber when viewed under polarized light. Determination of the number of reversals converted to convolutions might prove to be a means of determining when cotton has been overdried.

Our work on location of moisture in the fiber has evolved a method of water extraction which does not affect chemically bonded water. The amount of water that can be extracted from the fiber decreases significantly if the fiber has been dried above 212-257 degrees Fahrenheit. The standard regain value (overdried) also shows a slight decrease in this range. The difference between these two values for a given cotton sample might also be a means of determining if the fiber has been overdried.

Overdrying, Short Fibers Related

Our studies have confirmed previous findings that overdrying increases number of short fibers. We first ginned the cotton by hand and then dried the fiber, as opposed to drying and then ginning. We found that a slight permanent loss in length occurs on drying at temperatures above 212 degrees Fahrenheit. We then submitted the fiber to mechanical working (five passes through the cotton blender) and redetermined the lengths. Samples that had been dried at temperatures above 212 degrees Fahrenheit showed additional loss in length (up to 15 percent at temperatures in the range of 298 degrees Fahrenheit. Surprisingly, this loss in length occurs no matter if the fiber is "worked" in the dry state or in the equilibrated state (seven percent moisture). Thus, the initial over-drying has instilled into the fiber a weakness which shows up as fiber breakage when the fiber is subjected to mechanical working.

We also have been evaluating the drying process itself from a fundamental engineering standpoint. It is apparent that the fiber dries at the tip end almost instantaneously and dries at the base end very slowly. Thus, under condition of temperature and humidity sufficient to dry the inner portion of the fibers (in the semifluid type driers now used) the tip ends are severely over-dried, although the over-all mass appears (on an average moisture basis) to be properly dried. When the cotton reaches the gin stand it is still wet at the seed end and overdry at the tip end. Cotton in this condition is no doubt much more difficult to gin than a uniformly dried cotton would be.

An ideal drying method must operate under conditions which will produce a uniformly dried product. To accomplish this, we have undertaken fundamental engineering studies on the drying of seed cotton. These studies have two objectives: to develop, if possible, interim drying methods which can use present equipment and still prevent overdrying; and to develop a drying method and produce uniformly dried cotton.

The research program at the Agricultural Research Center is expanding to include gin cleaning and baling as well as drying.

An interesting result of these studies is the finding that cotton can be made to appear more lustrous by lint cleaning, which tends to provide some fiber combing. Thus, a higher grade can apparently be obtained simply by combing the fiber.

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Contest Pickin' Time Opens in Memphis

Regional winners of Little Miss Cotton of 1961 are now being selected in Memphis.

National finals for the 20 regional winners will be in Memphis, May 20.

This is the fourth contest on a national basis. Little girls—ages 6 to 10—are eligible.

Texas Cotton Association Convening in Houston

Texas Cotton Association members, currently attending their annual convention in Houston, will have a special golden anniversary program honoring charter members and past presidents of the Association. The March 17-18 convention is being held at the Shamrock-Hilton.

Arizona Economy
Cottonseed Plays Big Role

Cottonseed's importance in the economy of Arizona was discussed March 5 by Thomas Kelland, business and financial editor of The Arizona Republic in Phoenix.

Interviewing Tom Rollow of Western Cotton Products Co., the newspaper estimated that cottonseed brings Arizona about $20 million annually, of which about $16 million goes to producers and the remainder is for processing, transportation and supplies.

Arizona's seven cotton oil mills employ about 600 to 700 persons. Two of the mills are in Phoenix, with the others in Safford, Gilbert, Litchfield, Casa Grande and Chandler.

Feed Group Opposes Supports

Members of Midwest Feed Manufacturers Association went on record as opposing higher support prices for grains, soybeans and allied products in a resolution adopted at their annual meeting in Kansas City.

■ **LOUIS CHILDERS, head of current information work in ARS, Washington, died recently. Childers was a former associate editor of the Oklahoma Farmer-Stockman and one-time Extension editor and associate professor of journalism in South Dakota.**

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Representative Retires

VESS E. BROWNING, South Arkansas sales representative, Lummus Cotton Gin Co., has retired. Announcement is made by M. P. Collins, Memphis district manager. Browning, who has been associated with the cotton ginning industry since 1924, joined Lummus in 1947. A native of Abilene, Texas, he is a graduate of Southern Methodist University and a veteran of World War I. He is a master Mason member of the American Legion, Veterans of Foreign Wars and the Methodist Church. He and Mrs. Browning will continue to reside in North Little Rock, Ark. J. R. Stewart succeeds Browning as South Arkansas representative.

New Name Considered

ACMI Convention Slated For Miami Beach

A new organization name will be considered at the annual meeting of American Cotton Manufacturers Institute, at Miami Beach, March 23-25.

Directors will submit "American Textile and Cotton Manufacturers Inc.", a name accepted by the board from a special committee report.

American Cotton Manufacturers Institute has been the name of the textile trade association since 1949, when it was formed through a merger of American Cotton Manufacturers Association and Cotton-Textile Institute. In 1958, National Federaton of Textiles was consolidated with ACMI.

Institute President J. M. Cheatham of Griffin, Ga., has announced that Secretary of Commerce Luther H. Hodges will deliver the convention's keynote address.

Stocks Down Margarine Production Up

Margarine stocks, Jan. 31, totaled 35,300,000 pounds, compared to 36,700,000 pounds the comparable period of 1960. Production for the month was up to 175,300,000 pounds from 158,500,000 pounds in January, 1960.

Prices of Urea Reduced

Leading manufacturers have reduced prices of urea for fertilizer about $7.50 per ton.

Stoneville

(Continued from Page 10)

tioning in the fall of 1931, and by 1932 the staffs were well organized.

Hughes Butterworth, government cotton classer, now retired, rendered valuable services from 1932 until 1940.

With Public Works funds, a three-story office and fiber laboratory building was completed in 1934. Since that time a fire-proof building has been constructed from steel, concrete and brick, to house a three-stand, commercial type laboratory gin, and other buildings have been added.

By 1936, outstanding progress had been made in ginning research developments at Stoneville, and much information was available for practical application in commercial cotton gins. The idea was conceived of training men to become Extension cotton ginning specialists for the different cotton-producing states. The first such training school was held at Stoneville in 1936. Since the inception of this work in 1936, with S. P. Lyle as their "dean", the federal and state specialists have done a fine job of serving the industry, and numerous training schools have been held. J. C. Oglesbee, Jr., Atlanta, is federal Extension gin specialist east of the Mississippi River, and Alfred Pendleton of Dallas serves the territory west of the Mississippi River. The work of the state specialists is coordinated by these two men.

Changes in Ginning

Changes in ginning requirements since 1930 have been more numerous, more outstanding, and more widespread than those which occurred in the preceding 100 years. For instance, while annual cotton production has remained about the same, in 1930 there were 14,508 active gins in the U.S.; in contrast, only 5,629 active gins in 1959.

This drastic change in the number of active gins in the U.S. is partly due, not only to the engineering and technological advances which have provided better machinery with greatly increased capacity, but also to the fact that modern modes of transportation enabled the modern high-capacity gins to serve much larger areas.

In 1930, typical four-stand cotton gins cost from $10,000 in the Southeast to $20,000 in the Central, and $40,000 in the Western areas; while in 1960, the cost of a modern up-to-date gin in California ranges up to $650,000.

Three Ginning Laboratories

USDA now maintains three cotton ginning research laboratories, as a part of the Agricultural Engineering Research Division of the Agricultural Research Service. The Division also conducts ginning research at a state-federal ginning laboratory.

These laboratories are in locations selected with a view to working with problems peculiar to different cotton regions. The oldest and largest laboratory is the one at Stoneville. The Stoneville Laboratory is known throughout the world. It is headquarters for ginning research in the Mid-South states. The laboratory at Mesilla Park, N.M., serves the irrigated areas of the West and Southwest. The one at Clemson, S.C., serves the Southeast.

Each laboratory is on land owned by the federal government and near a state experiment station, where cooperative work in cotton production is carried on. Much of the cotton used in tests at the laboratories is provided by these experiment stations. Laboratory and experiment station agricultural engineers, plant scientists, and laboratory technicians cooperate in practically all phases

Pakistan Plans More Jute

An assurance of adequate seed has caused Pakistan's jute planters to plan an estimated 1,800,000 acres for 1961. This is an area 30 percent larger than the crop harvested in 1960 when drought reduced acreage.

The 1960 crop, reported at 2,250 million pounds, was barely able to meet demand. Prices remained abnormally high even after harvest of the new crop began.

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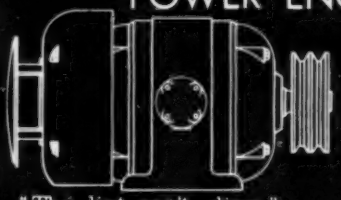

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of research applicable to the cotton industry.

A state-federal ginning laboratory is located at the Oklahoma Cotton Research Station, Chickasha, headed by W. E. Taylor. It serves Oklahoma and adjoining sections of North Texas, where machine stripping and rough hand harvesting are widely practiced. Federal projects are conducted through federal-state cooperation and financing. Another state-federal ginning set-up is located at the USDA Cotton Field Station, Shafter, Calif.

Each laboratory is equipped with representative types of ginning machinery suitable to its region. Their equipment also includes "test tube", bench model, roller and saw-ginning units, full-size saw and roller-ginning batteries, fiber-study facilities and instruments.

Conditions normally found at commercial gins are reproduced in the laboratories, but additional variations are further included for test purposes.

Shop facilities are available to laboratory engineers, who construct experimental machines and equipment. Inventions are fully publicized, usually being registered as public patents for the benefit of the cotton industry and the people.

• **Stoneville**—The laboratories have been hosts to delegations from practically all lands where cotton is grown. Groups, individual tourists, and officials have come to Stoneville from Pakistan, Turkey, India, Syria, Lebanon, and Israel; from the Sudan and other cotton-producing countries of Africa; from European countries that have cotton-growing colonies, including Great Britain, Belgium, France, Portugal, and Spain; from the West Indies; from Mexico and Central American countries; and from Colombia, Peru, Brazil and Argentina.

The laboratories also are visited by teachers and agricultural students from various parts of the U.S., by representatives of the textile industry, by manufacturers of ginning machinery, and by the interested public.

Vernon P. Moore is the engineer-in-charge of the Stoneville Laboratory. Other professional staff members now serving at Stoneville are: G. N. Franks, C. S. Shaw, A. C. Griffin, J. V. Shepherd, E. A. Harrell, O. L. McCaskill, G. J. Mangialardi and L. D. La Plue.

Sub-professional, clerical and shop personnel at Stoneville are: E. L. Jamison, E. L. Curtis, Ella J. Winn, Helen Edwards, Lillian Taylor, Irene H. Frazier,, Fannie B. Mauldin, C. L. Sawyers, E. H. Pugh, J. S. Ferriss, W. S. Kimbrell, Leroy Hendon, F. M. Giardina, R. D. Elmore and Durwood Hayes.

• **Mesilla Park** — Southwestern Cotton Ginning Research Laboratory, Mesilla Park, N.M., has been in operation since 1950. It has a roller-ginning laboratory, in addition to saw-ginning, and fiber-study facilities. Problems high on the priority list at this Southwestern Laboratory include (1) improvements of roller ginning of extra-long staple American-Egyptian types of cotton, and (2) maintaining fiber quality through ginning with the large scale stream-lined machines used in the irrigated Upland cottons grown in the West and Southwest.

The Laboratory and the experiment stations of New Mexico, Oklahoma, Texas, Arizona and California cooperate in research at Mesilla Park to determine how ginning requirements are affected by new varieties and by improved cultural, pest-control, and harvesting practices.

Victor L. Stedronsky is the engineer-in-charge of the Mesilla Park Laboratory. Other professional staff members now serving at Mesilla Park are: D. M. Alberson, W. E. Chapman, Jr., and C. G. Leonard. Sub-professional, clerical, and shop personnel are: Mary J. Chapman, Doris R. Williams, Frances C. Rooker, J. V. Martinez, E. A. LeBlanc, E. V. Ziehl and A. L. Raney.

• **Clemson** — Personnel of the Clemson Laboratory cooperate with the South Carolina Experiment Station and with stations in the Southeast in conducting research on harvesting and ginning.

The rapid conversion to newer mechanical and rough hand-harvesting methods throughout this region in recent years has multiplied ginning problems. Increased amounts of burs, stems, leaf fragments, and trash have necessitated more cleaning. Higher moisture content in the harvested cotton has necessitated more drying. This additional cleaning and possible over-drying may result in fiber damage. The Laboratory is testing combinations of methods and equipment designed to overcome these difficulties.

James A. Luscombe is the engineer-in-charge of the Clemson Laboratory. Other professional staff members at Clemson are: J. B. Cocke, W. E. Garner, J. V. Lee, and J. M. Williams. The sub-professional, clerical, and shop personnel include: Louise C. Able, Lizzette B. Price, H. C. Carson, J. C. Holden and S. A. Porter.

Research Accomplishments

Jointly these laboratories have made many significant contributions to the cotton industry. A partial listing of Ginning Laboratory machinery developments includes:

Several types of seed cotton driers and drying processes for conditioning seed cotton for optimum cleaning and ginning.

Standardization of saw gins, including all-metal frames and construction; roll box shapes; saw-tooth sizes and shapes; and optimum saw spacings and speeds for smoother ginning of cotton, with a minimum of fiber damage; and both brush and airblast doffing improvements.

Standard density presses for packaging the bale in one operation to densities suitable for carload shipment and for export.

A seed cotton feed control device for improving the cleaning effectiveness of equipment within gin plants and for prevention of down-time due to chokages from overfeeding of equipment.

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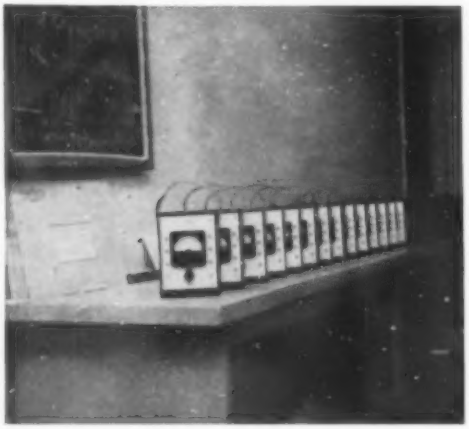

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A gin-capacity lint cleaner suitable for the removal of fine trash and motes.

A continuous moisture-measuring device.

Small pipe systems for handling seed and trash with less power and operating troubles.

Trash handling and collecting systems for the elimination of dust hazards connected with gins.

A lint handling system for roller gins which reduces labor considerably and which provides for cleaner, more acceptable lint.

A seed drier-cleaner to condition planting seed for storage and for the prevention of losses in germination and build-up of free fatty acid.

An improved moting system for saw gins which greatly improves the cleaning accomplished within the gin stand.

Straight-blade fan specifications and service requirements for 100 percent kill of pink bollworms in gin and oil mill waste.

An improved roller gin with capacity comparable to that of saw gins for handling extra long staple cotton.

A recently improved saw gin with considerable capacity increase over current standard models.

Studies carried out at the Ginning Laboratories, which have yielded information on important phases of ginning but not directly resulting in machinery developments, include the following:

Basic gin stand operation and maintenance requirements such as roll density, saw-tooth shape, speed, doffing, moting, safety measures, etc. Filing requirements for saws and general maintenance items pertaining to loose roll operation which has effects on fiber qualities.

Optimum moisture content for most efficient ginning, cleaning, packaging and storage.

Power requirements for ginning, conveying, packaging, and information to improve the efficiency of operation within the plant.

Information on material handling as to conveying requirements with respect to air volumes, velocities, speeds of conveyors, etc.

Packaging studies with regard to efficiency of bale covering materials, ties, package size, handling efficiency, etc.

Efficient combinations and sequences of drying, cleaning, and lint cleaning for various types of harvesting. These studies, conducted with commercially available types of equipment, have been invaluable to ginners, and in turn to farmers, in holding cost of ginning to a minimum while providing for the most efficient service possible.

Studies of efficient arrangements of machinery within the gin house to provide for access to machinery and in turn more effective use of the equipment within the plant.

Effects of cotton varietal differences on ginning, resulting in improved fiber quality.

Relationship of picker-harvesting practices to ginning requirements; such things as the effect of time-of-day of harvest on moisture content and the optimum amounts of moisture which should be applied to the spindles.

Uses and limitations of wetting agents, oil sprays and inorganic substances in piping, seed rolls and on lint slides and in cotton pickers.

A list of the public service patents obtained by the several Ginning Laboratories on processes used in gins reads as follows:

Number	Title	Date granted
1,695,991	Seed Cotton Drying Apparatus	Dec. 18, 1928
1,707,929	Process and Apparatus for Drying Seed Cotton	Apr. 2, 1929
1,707,930	Seed Cotton Drying Apparatus	Apr. 2, 1929
1,827,183	Process and Method for Ginning Cotton with Air-Blast Gins	Oct. 13, 1931
1,871,773	Apparatus for Drying Seed Cotton	Aug., 1932
2,002,974	Fractionation Device and Method for Employing the Same	May 28, 1935
2,045,064	Device for Culling and Grading Seed Cotton	June 23, 1936
2,078,309	Apparatus for Drying Seed Cotton	Apr., 1937
2,156,893	Cotton Sampler Apparatus	May 2, 1939
2,173,071	Machine for Sampling Cotton	Sept. 12, 1939
2,189,099	Drying Systems for Seed Cotton	Feb. 6, 1940
2,196,613	Apparatus for Determining the Percentage, by Weight, of Linters on Cottonseed	Apr. 9, 1940
2,225,397	Cotton Fan	Dec. 17, 1940
2,264,910	Integrator for Circular Ordinates	Dec. 2, 1941
2,339,394	Baler	Jan. 18, 1944
2,365,496	Moisture Measuring Instrument	Dec. 19, 1944
2,569,501	Lint Cotton Cleaner	Oct. 2, 1951
2,580,451	Stick Remover for Seed Cotton Extracting Machines	Jan. 1, 1952
2,634,461	Cotton Gin Cleaner (Recipro)	Apr. 14, 1953
2,651,812	Cotton Turbocleaner Process	Sept. 15, 1953
2,734,230	Cotton Fiber Blender	Feb. 14, 1956
2,735,226	Methods and Apparatus for Treating Cottonseed	Feb. 21, 1956
2,747,234	Methods of Moisture Restoration to Cotton	May 29, 1956
2,764,013	Apparatus for the Restoration of Moisture to the Fibers of Seed Cotton	Sept. 25, 1956
2,836,856	Seed Cotton Cleaner	June 3, 1955
2,812,555	Cotton Bale Sampler	Nov. 12, 1957
2,859,485	Cotton Sampler	Nov. 11, 1958
2,910,731	Textile Fiber Sorter	Nov. 3, 1959

These public service patents on basic items of equipment serve to keep the field open to all manufacturing concerns, thereby enabling them to provide the benefits of the improvements afforded by the equipment to ginners at a minimum cost.

Several of the developments and improvements listed above have been of major importance to cotton producers in increasing the income derived from the sale of their cotton. Three of these improvements and their contributions to the monetary gain of the producer are listed below as examples:

The expanded use of the seed cotton drying processes, the first development of the laboratory, has resulted in the almost complete elimination of penalties for rough preparation bales. The number of bales so penalized in the early thirties amounted to more than 10 percent of the crop produced in the Delta area. These penalties represented a reduction in value of one grade which, on today's

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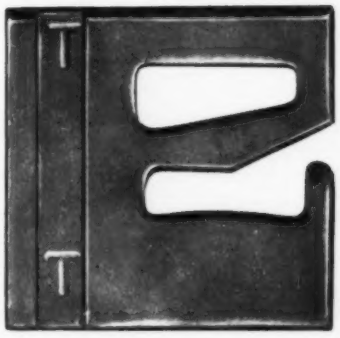

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market, would amount to approximately $15 per bale—a very conservative figure—on the 10 percent of the crop so affected. The reduction of nine percent—from 10 percent to one percent—amounts to the improvement of one grade on nine percent of three million bales produced in this area. This development, in improving preparation, is therefore worth some four million dollars annually to the cotton producers of the Mid-South area alone. Drying facilitates all cleaning, and in this area of improvement, the contribution of the drier towards grade improvement amounts to many millions of dollars annually.

The lint cleaner developed at Stoneville, and on which a public patent was obtained, is responsible for improvement in the grade of cotton to the extent of two-thirds of a grade in machine-picked or rough hand-harvested cottons. Commercial models of this development are now used on almost the entire crop produced in the U.S. We may safely assume a $10-per-bale increase due to the grade improvement afforded by lint cleaning, and when we apply it to 10 million bales out of the annual crop, we arrive at a figure of $100 million annually. This development is also credited with making the use of mechanical harvesting economically feasible, thereby releasing labor to industry, while allowing the reduction of labor and labor cost requirements in cotton production and helping to keep the industry competitive.

The collective improvements made in saw gins through the development of the recipro-cleaner, the information developed in the effects of roll box shapes, saw speeds, etc., on the value of cotton have collectively resulted in the improvement in grade produced by saw gins of approximately one-half grade. These improvements are in widespread use, and it is estimated that two-thirds of the annual crop is now processed on equipment incorporating these improvements. This one-half grade improvement on eight million bales of cotton is worth at least $56 million annually.

Despite the long list of achievements by the U.S. Cotton Ginning Laboratories, plus the outstanding developments of gin machinery manufacturers, grades of American cotton have continued to decline slightly in light of the increased use of mechanical harvesters of all types and the increase in rougher hand harvesting. Also, changes in spinning mill practices, brought on by increased cost of labor used in processing cotton through spinning and weaving, has further placed burdens upon the requirements for processing at gins.

Complaints by mills to the effect that modern cottons are not processing through their plants satisfactorily have opened the eyes of researchers to the role the gin plays in maintaining quality from the field to the spinning mill. A close look at the problem would indicate that modern mill requirements are far in excess of those existing prior to World War II. This is exidenced by the fact that spindle speeds have been increased from 7,000 rpm to 10,000 rpm or more, carding rates have been increased from some six pounds per hour to 12-15 pounds per hour in commercial production, and the competition of synthetic fibers has alerted the spinning industry to the fact that waste in cotton is a serious loss to them and that blends of synthetics with cotton make it possible to increase the output of the spinning process.

Progress has been made in developing improved varieties which are stronger and which possess other properties such as less short fiber, earlier maturing varieties which, to some extent, eliminate field damage, and other improvements in fiber properties which must be maintained through improved ginning practices.

Many Problems Ahead

A list of the broad basic problems requiring solution in the ginning field is about as impressive as the list of accomplishments afforded by past research in this field. A listing of the broad problems that require solution is as follows:

A complete moisture control system for cotton gins, which would require drying and/or adding moisture to provide for processing under optimum moisture conditions during all phases of ginning.

New designs of gins which would provide for separation of seed and fiber without fiber damage, such as the elimination of nepping and fiber breakage within the ginning unit; and new designs for selective staple length ginnings in stages.

New designs of seed cotton cleaning machinery which would more efficiently remove all types of foreign matter without damaging the fiber.

More complete automation of the ginning process, which could reduce cost of ginning through reduction in labor requirements for operating equipment.

A study of existing equipment and methods used with a view toward simplification of equipment requirements in overhead cost.

A basic study of the forces involved in handling, cleaning, and ginning to provide information on the sources of fiber damage and means for improvement.

A basic study of methods used to evaluate the effect of ginning on fiber quality so that progress in machinery development can be accurately measured.

Additional work should be done toward development of a completely satisfactory packaging and sampling system for gins, with attention towards handling increased ginning capacity and eventual automation.

Further investigations on storage are needed to enable gins to operate for longer periods at lower overhead cost.

Additional basic work on lint cleaning, which would provide information for improvement or re-design of equipment to improve cleaning and to reduce fiber damage.

This indicates that research in ginning will be a continued need, as long as cotton is a major crop in the U.S. The general view of the Cotton Ginning Research staff is that the greatest achievements in cotton ginning research may lie in the future rather than in the past.

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PAPER and METAL TAGS

"Choice of the Nation's Ginners"

Texas TAG & SPECIALTY Co.

Wolfe City, Texas

laugh it off

Overheard after a famed middleaged character had married a girl half his age: "He's really got a problem. He doesn't know whether to take her on a honeymoon or send her to camp!"

• • •

A workman was perched on the top of a ladder, cleaning the clock above the entrance to a bank. Suddenly an inquisitive passerby hailed him.

"Something wrong with the clock, mister?" he asked.

"No," replied the workman, "I'm nearsighted."

• • •

Two ducks were walking down the road toward the pond when one of them quacked: "Oh, quit trying to walk like a woman wearing slacks."

• • •

Teacher—"Can any boy give me a sentence which includes the word paralysis?"

Little Johnny—"Please miss, I can—I went for a swim yesterday and lost my trousers and had to go home in a pair Alice's."

• • •

"Here's my bill for services rendered," the lawyer told his client, as he handed him a slip of paper. "You can pay $300 now, then $50 a month for the next 18 months." "Gosh," the client replied. "Sounds like buying a car." Said the lawyer, "I am."

• • •

When the examination was over, the teacher in a mountain school told her pupils to write a pledge that they had neither received nor given help. One gangling youth, who had squirmed in dismay and mopped a bewildered brow throughout the ordeal, wrote: "I ain't received no help in this matter, and God knows I couldn't have gave any."

• • •

The pretty young teacher was explaining the difference between abstract and concrete.

"Concrete means something you see," she told the children, and "abstract something you can't. Now who will give me an illustration?"

Little Tommy in the first row was the first to hold up his hand. "My pants are concrete," he said, "Yours are abstract."

• • •

At the hill country revival meeting the minister was giving it everything he had to gain some conversions. "Now, Daisy Mae," he said to one rather curvaceous prospect. "I'm going to lead you out into this stream here and wash out every spot of sin that you've got."

"Oh, parson," giggled the young girl as she stepped forward, "in that little biddy ole crick?"

• • •

The butcher quarreled with his assistant. A few evenings later this man walked into the shop when it was full of people and swung a dead cat on the counter, saying: "That makes the dozen."

The customers looked at each other and then began to melt away.

• • •

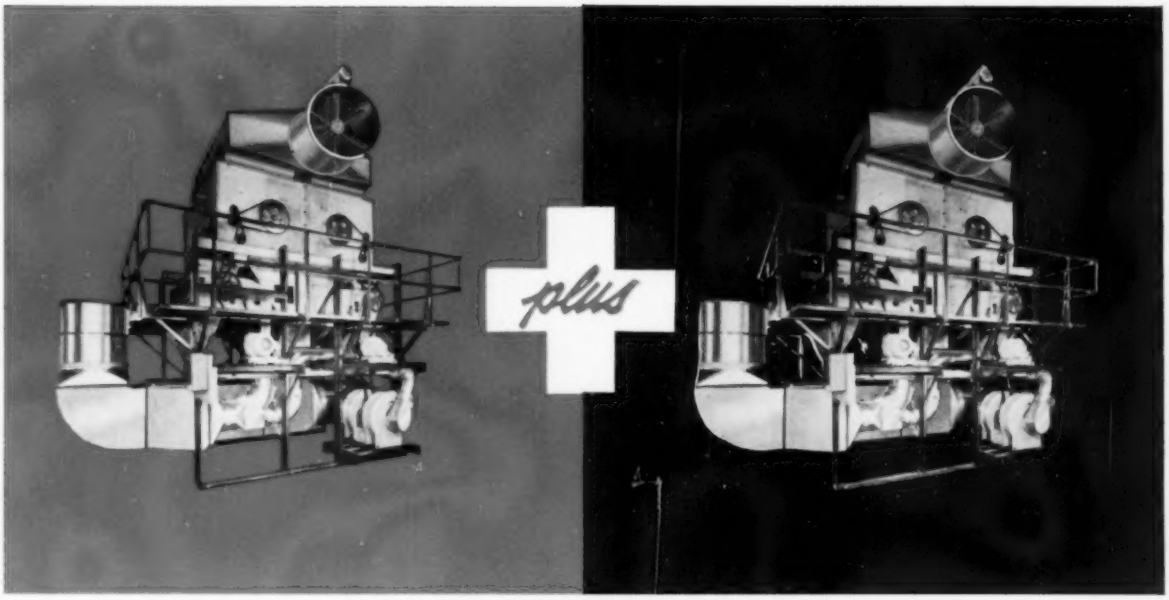
This sign in a Boston, Mass., store window declares: "We undersell the store that undersells the store that will not be undersold."

• • •

Middle age: The time of life when your favorite night spot is a seat in front of the television.

SETTING A NEW PACE FOR MODERN GINNING

MOSS DOUBLE LINT CLEANING



GIVES YOU

Highest profits! Greatest sample improvement! Puts you years ahead of competition!

The MOSS in tandem is an advanced idea already tested and proved by hundreds of ginners throughout the cotton belt. They report that even with rough-picked and badly damaged cotton, spotting was virtually eliminated, color improved, and samples bettered by as much as one or two full grades.

With MOSS double lint cleaning "profits soared $10 to $35 a bale," according to one Texas ginner. The growing "trend to tandem" is the trend to more efficient, more profitable ginning operations. Add a MOSS to your present MOSS, or to any other lint cleaner in your plant — and enjoy a bigger, better season this year.

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MOISTURE CONTROL

NOW POSSIBLE with FIBER-RITE

The FIBER-RITE automatically registers moisture content of the seed cotton constantly as it passes through the Feed Control Unit and prior to reaching the drying or cleaning operations. The percentage of moisture in the seed cotton registers on the Fiber-Rite; this information is electronically relayed to a modulating valve which controls the supply of gas to the heater, resulting in a constant regulation of drying.

The Fiber-Rite can be set so that seed cotton, after leaving the drying operations, will contain the optimum moisture content for best ginning results.

The "electronic brain" of the Fiber-Rite takes the guesswork out of cotton drying, resulting in better and more uniform grades, and assists in supplying spinners with the cotton they desire.

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